The Communicator

September—October 2023

SARC

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The Bi-monthly Journal of Surrey Amateur Radio Communications

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Our article reprint policy is on page 121

Issues appear bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

Contributions of articles and photos are welcome.

During non-publication months we encourage you to visit the Digital Communicator at **ve7sar.blogspot.ca**, which includes recent news, past issues of ***The Communicator***, our history, photos, videos and other information.

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If you find ***The Communicator*** worthwhile, regular readers who are not SARC members are invited to contribute a $5 annual donation towards our Field Day fund via PayPal.

SARC maintains a website at **www.ve7sar.net**

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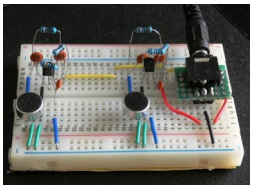

Daniel Romila is back with several projects and information on a variety of electronics.

Larry VE7LXB .with a story on our GOTA initiatives and the journey that brought us to our most successful Field Day GOTA station ever.

In this issue Kevin takes a deep dive into WSPR and we have a report on our next SARC build project, a WSPR beacon.

...and so much more!

QRM -- -.- .-. --

...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?
*eMail it to **communicator at ve7sar.net** for inclusion in this publication.*

Well this was quite an issue to compile! There is once again a variety of Amateur Radio activity to read about. Don't forget to click on the links throughout the publication. In most cases they will provide you with additional information, videos and other web-based content that we just cannot provide in any other form.

I was asked recently why we still publish a printed (electronic) publication. We do have a website https://ve7sar.net and three blogs for our club (including this publication) https://ve7sar.blogspot.com, for our emergency program SEPAR https://ve7hme.blogspot.com, and for out 'Get on the Air' new ham initiatives at https://ve7rsc.blogspot.com.

But why publish? We're not in the business of competing with the big publications. I enjoy reading other club publications, although there seem to be fewer every year. The Communicator grew to its present size because of feedback. I do get comments from some of our own club members that it has grown too big, but there is much more feedback from around the globe that praise our team for the variety of content and the amount of information, without ads on every page.

It is still a labour of love and appreciation for the satisfaction that this hobby has brought us… so enjoy! And please share it with someone.

73,

~ John VE7TI, Editor
communicator@ve7sar.net

This Month's Cover…

Kevin McQuiggin VE7ZD/KN7Q is a regular contributor to The Communicator. He has recently moved to Vancouver Island and is setting up his station at a new waterfront location. He recently captured this early morning shot while making EME contacts.

"I hate the outdoors. To me the outdoors is where the car is"— *Will Durst*

On the Web

ve7sar.net

Between Communicators, watch your e-mail for news, announcements of Amateur Radio events, monthly meetings and training opportunities.

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The Rest Of The Story…

Telegraphy, Radio and TV

Karl Ferdinand Braun

Karl F. Braun (6 June 1850 – 20 April 1918) was a German electrical engineer, inventor, physicist and Nobel laureate in physics.

Many people have memories of the early history of radio development summed up in a single word: Marconi. This is not undeserved as Marconi and the companies he founded were instrumental in the development of wireless telegraphy and radio. The transition from the wired telegraph to wireless telegraphy came at a time of turmoil in Europe and was in part driven by different country's desire for improved communication.

At the outbreak of WWI, verbal radio was still in its infancy and crossing any significant distance in wireless communications was achieved by the "dits and dahs" of Morse Code, whose cultural legacy remains with us in the form of SOS as a distress signal, chosen for its simple three "dits", three "dahs", three "dits" pattern. One of the fathers of this technology remains unsung in much of the world due to Germany's loss of WWI. Despite numerous technical contributions, Karl Ferdinand Braun, remains largely unknown to many English-speaking people.

Most of us in today's world have viewed images on a Cathode Ray Tube, commonly known among English speakers as a CRT. Before the advent of semiconductor flat panel display technology, every TV and computer sported a CRT as its most prominent feature, but how many know who invented it? It was Karl Ferdinand Braun. Braun contributed significantly to the development of radio and television technology. He shared the 1909 Nobel Prize in Physics with Guglielmo Marconi "for their contributions to the development of wireless telegraphy", was a founder of Telefunken, one of the pioneering communications and television companies, and has been both called the "father of television" (shared with inventors like Paul Gottlieb Nipkow) and the co-father of the radio telegraph, together with Marconi.

Braun was born in Fulda, Germany, and educated at the University of Marburg and received a PhD from the University of Berlin in 1872. In 1874, he discovered that a point-contact metal-semiconductor

junction rectifies alternating current. Braun studied the characteristics of electrolytes and crystals that conduct electricity at Würzburg University in 1874. When he probed a galena crystal (lead sulfide) with the point of a thin metal wire, Braun noted that current flowed freely in one direction only. He had discovered the rectification effect at the point of contact between metals and certain crystal materials.

Braun demonstrated this semiconductor device to an audience at Leipzig on November 14, 1876, but it found no useful application until the advent of radio in the early 1900s when it was used as the signal detector in a "crystal radio" set. The common descriptive name "cat's-whisker" detector is derived from the fine metallic probe used to make electrical contact with the crystal surface.

He became director of the Physical Institute and professor of physics at the University of Strassburg in 1895.

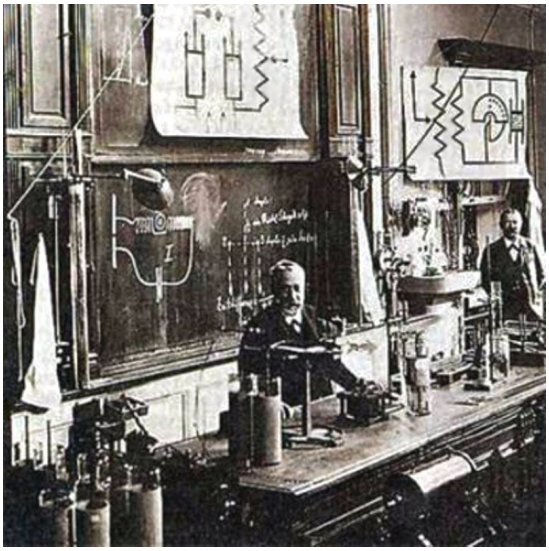
During the development of radio, he also worked on wireless telegraphy. In 1897, Braun joined the line of wireless pioneers. His major contributions were the introduction of a closed tuned circuit in the generating part of the transmitter, its separation from the radiating part (the antenna) by means of inductive coupling, and later on the usage of crystals for receiving purposes.

Also in 1897, he built the first cathode-ray tube (CRT) and cathode ray tube oscilloscope. The CRT became the cornerstone in developing fully electronic television, being a part of every TV, computer and any other screen set up till the introduction of the LCD screen at the end of the 20th century. It is still mostly called the "Braun tube" in German-speaking countries (Braunsche Röhre) and other countries such as Korea and Japan. Around 1898, he invented a crystal detector.

Wireless telegraphy claimed Dr. Braun's full attention in 1898, and for many years after that he applied himself almost exclusively to the task of solving its problems. Dr. Braun had written extensively on wireless subjects and was well known through his many contributions to the Electrician and other scientific journals. In 1899, he would apply for the patent Wireless electro transmission of signals over surfaces. Also in 1899, he is said to have applied for a patent on Electro telegraphy by means of condensers and induction coils.

Pioneers working on wireless devices eventually came to a limit of distance they could cover. Connecting the antenna directly to the spark gap produced only a heavily damped pulse train. There were only a few cycles before oscillations ceased. Braun's circuit afforded a much longer sustained oscillation because the energy encountered less losses swinging between coil and Leyden Jars. And by means of inductive antenna coupling the radiator was better matched to the generator. The resultant stronger and less bandwidth consuming signals bridged a much longer distance.

Braun invented the phased array antenna in 1905. He described in his Nobel Prize lecture how he carefully arranged three antennas to transmit a directional signal. This invention led to the development of radar, smart antennas, and MIMO.



Braun as professor of Physics at the University of Strasbourg, France

Braun's British patent on tuning was used by Marconi in many of his tuning patents. Guglielmo Marconi used Braun's patents (among others). Marconi would later admit to Braun himself that he had "borrowed" portions of Braun's work. In 1909, Braun shared the Nobel Prize for physics with Marconi for "contributions to the development of wireless telegraphy". The prize awarded to Braun in 1909 depicts this design. Braun experimented at first at the University of Strasbourg. Not before long he bridged a distance of 42 km to the city of Mutzig. In spring 1899, Braun, accompanied by his colleagues Cantor and Zenneck, went to Cuxhaven to continue their experiments at the North Sea. t is likely that his understanding of the concept of resonance would later play a role in his inspired electrical innovations. On 24 September 1900 radio telegraphy signals were exchanged regularly with the island of Heligoland over a distance of 62 km. Light vessels in the river Elbe and a coast station at Cuxhaven commenced a regular radio telegraph service.

World War I and change

Ferdinand Braun helped change all that. Braun and Marconi were jointly awarded a Nobel Prize in 1909 for "contributions to the development of wireless telegraphy." Marconi even admitted to Braun himself that he "borrowed" several of Braun's patents. It was during his work on wireless telegraphy that Braun invented the first diode, without which there would be no modern electronics as we know it. It was also here that Braun's early work with acoustic resonance came into play as he improved the wireless technology including inventing the phased array antenna.

During the Russo-Japanese war of the early 20th century and before the outbreak of WWI, the combat efficacy of wireless communications was proven by the Japanese sinking of the Russian flagship Petropavlovsk. Baited out of Port Arthur with small ships, torpedo boats were called in as reinforcements by wireless. At the outbreak of WWI, Braun's workplace, then at Strasbourg, was shut down and the city filled with troops. Braun's family was scattered by various circumstances. When the tide of war ebbed Braun returned to Strasbourg to find his university's station locked behind closed doors, being used by the military as one point of the first known radio triangulation efforts to track ships at sea. The British ships were tracked and the U-boats success at finding prey may have been due to this effort.

Prior to the war, with Marconi's efforts tied up, the only world wide network of communications was set up by Telefunken. Many pieces of this network were destroyed in the early days of the war in an effort to isolate Germany. The Sayville station, outside New York and the last of the offshore Telefunken stations to remain operational, had recently been upgraded and was able to receive reports from Germany. It came under assault for patent infringements in efforts to shut it down, with Marconi himself scheduled to testify. Braun decided to travel to New York to help counter the British efforts to shut it down. Diagnosed and treated for cancer ten years earlier though, the disease was rearing its head again making Braun aware that this trip might be the last effort of his life. Risking winter travel and the Atlantic blockade (his own son had been caught at sea returning from America and imprisoned), Braun left for New York without much hope of seeing his homeland or family again. Departing from Bergen, the captain went far out of the normal sea routes, passing just south of Iceland to deliver his "cargo," for, besides Braun and his three companions, the ship was carrying a new transmitter and antenna setup for the Sayville station. Shortly after Braun's arrival in New York he had a pleasant surprise when his son, released from internment by the British, was allowed to return to America.

In part due to Braun's presence, the lawsuit against Sayville went in Telefunken's subsidiary's favor. However Sayville was taken over by the US Navy when America declared war on Germany.

His job done, Braun petitioned the British government for safe passage to Germany but they were non-committal. Braun remained in America under the watchful eyes of British intelligence, and coming to the realization that the British did not want him back in Germany, Braun resigned himself to life in the Catskill Mountains of New York until the war ended. Many American scientific groups, pleased to have a Nobel Prize winner nearby, treated him to feasts and event invitations, easing his isolation. He continued to write articles on physics, one of his last being "Physics for Women," a practical aid to housewives everywhere. In 1918 Braun slipped and fell. He broke his hip, went into a sickbed, and never arose. He passed away shortly thereafter.

Scientist, teacher, innovator, and patriot to his country, Braun was a remarkable and admirable man written out of history by the winners of WWI. The next time you view the iconic 1960s TV show The Outer Limits' introduction, with its elemental display of oscilloscope functionality, take a moment to reflect upon a 20th century without the Cathode Ray Tube. Braun was the first to control the horizontal and vertical, bringing much of physics in to crystal clarity. Life would not be the same without his wonderful "Braunsche Rohre" and other miraculous inventions.

And that is history.

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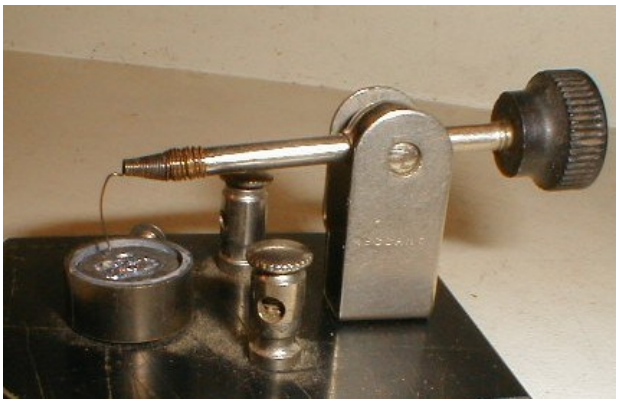
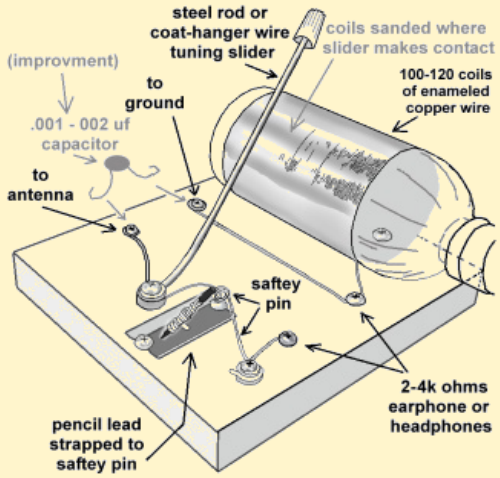


Galena and the 'Cat's Whisker'

Galena is the primary ore of lead, and is often mined for its silver content. It is used as a source of lead in ceramic glaze.

Traces of galena are frequently found at the Mississippian city at Kincaid Mounds in present-day Illinois. The galena used at the site originated from deposits in southeastern and central Missouri and the Upper Mississippi Valley.

Galena is a semiconductor with a small band gap of about 0.4 eV, which found use in early wireless communication systems. It was used as the crystal in crystal radio receivers, in which it was used as a point-contact diode capable of rectifying alternating current to detect the radio signals. The galena crystal was used with a sharp wire, known as a "cat's whisker" in contact with it.



The 'cat's whisker' [above] and an easily constructed radio set using the point-contact diode principle discovered by Braun [right].

Field Day 2023

Three hundred and ninety-nine GOTA Field Day contacts!

An amazing feat

by LARRY BLOOM VE7LXB

To say that our Club Executive was amazed would be an understatement, but it was true! **A dozen newly licensed hams working 24 hours straight had achieved the improbable - almost 400 North American QSO's.** Surely this must be a GOTA Field Day record. Hasn't the GOTA FD station traditionally been an afterthought? To understand how this came about some background is required.

Surrey Amateur Radio Communications (SARC)

Surrey Amateur Radio Communications (SARC) had its beginnings almost 50 years ago in the Electronics Lab of a local secondary school. Today, SARC is affiliated with the Surrey Emergency Program Amateur Radio (SEPAR). SARC and SEPAR include both licensed radio operators and

other community volunteers involved in the City of Surrey Emergency Program. The SEPAR Operations Training Centre is located near the Surrey Provincial Court building. Onsite equipment includes three fully equipped stations - an Icom 7610, a Flex 6600, an Icom 9700, and a Kenwood 220 mobile. There is a tower with a TH-7, an OCF wire antenna and a variety of VHF/UHF antennas.

SARC Course Offerings

For the past 15 years, SARC has offered Basic Amateur Radio courses. These courses are well attended, have received much positive feedback, and have produced many new hams, both young and old. For years, they were offered in a classroom setting, but COVID changed all that. Today, course offerings are all online and students have indicated that is their preferred learning method. As a result, participants reside both locally and throughout N. America. For example, two of our recent graduates live in Mexico.

Unfortunately, we've discovered that many of our course graduates never get on the air and within a few weeks drop out of ham radio completely. This shouldn't be surprising. For example, research has revealed that only about one-half of new hams get on the air. But why not? After all, more new hams than ever before are getting certified. In 2007 the Morse Code requirement was dropped. You can now get certified with zero on-air experience and some test answer memorizing.

Although the exam pass rate may be high and licensing applications may be climbing, that doesn't necessarily lead to more *active* hams. If these newbies don't have a practical knowledge base, they are limited in what they can accomplish. **Amateur Radio is a prized skill set but it's not intuitive.** The obstacles appear to be a poor understanding of repeaters, lack of familiarity with on-air jargon, unease programming radios, and a natural reluctance to press the PTT button.

My experience

I graduated from the SARC course in late spring, 2022. Like many course graduates, I became 'stuck' after receiving my certification. I had no idea how to program my radio or activate a repeater. I was also reluctant to press the PTT button. So, my certificate went up on the wall and my radio went into a drawer.

Stubbornly, after a few months, I talked a buddy into taking the course, so I'd be assured of a friendly contact. Course instructor, John VE7TI, offered to program our radios. Armed with offsets, memory channels, and sub audible tones, my friend and I made contact through a local repeater. Eureka, I had pressed the transmit button and survived!

I soon swapped my Baofeng UV-5R for a Yaesu FT-60, replaced my rubber ducky with a Nagoya Diamond whip, and joined a few nets. But I was just getting started. I then worked up the courage to join the Saturday morning SARC breakfast. I worried as to how the club would receive a newbie with no electronic skills or expertise, but I soon discovered that this was needless anxiety. I was welcomed warmly and genuinely. Today, about a year after passing my exam, I own an IC-7000, a mAT-180 tuner, an Alinco switching power supply, an MFJ dummy load, Workman Ham sticks, a 20aH LifePo4 battery, and an IP22 charger. I was

Larry Bloom, VE7LXB resides in Langley, BC. Larry is a retired high school teacher who passed his Amateur Radio Basic with Honours in late spring of 2023. Larry is the New Ham Coordinator as well as a Director for Surrey Amateur Radio Communications (SARC) and is passionate about helping new hams get started in Amateur Radio. Larry helped develop the GOTA (Get On The Air) Workshop and is Net Control for the GOTA 2 meter Net which meets each Thursday evening at 8pm. Larry is also a member of Surrey Emergency Program Amateur Radio (SEPAR), and competes in HF contests as part of the SARC team.

quickly falling down the RF rabbit hole, but I sensed that I might be the exception rather than the rule.

My idea

I suspected that many other new hams remained frustrated and discouraged. So, I approached John with a plan that I felt might help course graduates transition into the *active* world of Amateur Radio. After some brainstorming, we produced a model:

A free GOTA ("Get On The Air") workshop for course graduates. The workshop would review simplex and repeater operations, on-air etiquette, and how to make those first contacts. The session would also cover VHF/UHF radio and antenna options, survival communications and an intro to contesting. *Importantly, we would also offer to program participant radios.* The workshop would end with an informal net to help the newbies get over mic reticence.

A weekly GOTA Net. The Net would include a Roundtable in which new hams would be encouraged to discuss their progress and pose questions to the Elmers attending.

A blog (ve7rsc@blogspot.com) focused on new ham issues. This would complement our SARC and SEPAR blogs.

Follow-up assistance for the newbies. This would include regular emails with topics of interest, frequent hands-on projects, offers of inexpensive antenna upgrades, and HF training at the OTC.

A New Ham Coordinator. This person would be responsible for organizing and managing all SARC new ham initiatives.

Interest in our GOTA program has exceeded expectations. The March workshop filled up quickly. Our June workshop required a 2nd session. Our August workshop was half filled with registrations within two weeks of posting.

As for our GOTA Net, participation has ebbed and flowed but is slowly growing in numbers. Although newbie HTs have been programmed, activating a repeater 30 kms away can be challenging with a cheap handheld radio and a rubber ducky antenna. This has been frustrating for our participants, but the frustration comes with an unseen benefit. It has motivated the new hams to explore radio and antenna upgrades. Many who were initially discouraged, now reach our repeater with a j-pole constructed at our basic course antenna workshop, or with an upgraded rig such as a VHF mobile. Interestingly, our newbie Net has also begun attracting new hams who did not graduate from our course – apparently through word of mouth.

Rookie Roundup

Our first GOTA HF contest was the American Radio Relay League (ARRL) Rookie Roundup. The ARRL is a national organization of amateur radio operators in the U.S.A. To qualify as a contestant, operators were limited to a maximum of 3 years ham experience. The contest was held Sunday, April 16th and our group competed as Multi-Op using the club call VE7SAR. Although propagation conditions were not optimal, we made 38 QSO's over 16 states and 2

Lesley VE7CMI awaits her turn to operate while Dale VE7LWt logs for U.B. VE7UBZ.

provinces. Our final score was 1026 including multipliers. Not too shabby for our first time competing, but the best was yet to come.

Field Day 2023

With the Rookie Roundup under our belt, SARC newbies were anxious to try Field Day in the GOTA category. This year the ARRL gave emphasis to GOTA stations. Although our GOTA participation has been minimal in past years, this year SARC decided to give GOTA priority given the bonus point potential. In no time we had a motivated group of newbies backed by the full support of our club directors.

Beginning at 11 am PST, our GOTAs began transmitting out of the SEPAR trailer using an IC-7610 graciously lent to us by Icom. The IC-7610 is an HF (short wave) transceiver, and one of the high-end models in the amateur radio marketplace. For the next 24 hours, we ran, we pounced, and we spun the dial on the 15, 20, 40, and 80m bands, utilizing our 110' "Bigfoot" mobile tower with a TH-7 Tribander. Given their lack of HF experience, we had one newbie transmitting while another logged. After an hour, the operator took a break, the logger took the operator's place, and another GOTA sat in the logging chair. And so, we rotated through. I was amazed at how quickly the newbies picked things up. **Our biggest issue was convincing them to relinquish the mic!**

Exhaustion set in by 11 am Sunday morning, but we knew that we had accomplished something special. Congratulations to Doug VE7JDJ, Dale VE7LWT, Lesley VE7CMI, Katrina VA7WBT, Mike VE7YEG, UB VE7UBZ, Ernie VE7ODK, Alex VA7PVC, Dmitry VA7DVO, Larry VE7LXB, and Manvir VA7BKI for their efforts and enthusiasm. And thanks to GOTAs Aravind, De, and Gary who visited to cheer us on. We know that we can't compete as GOTAs next year, but we're confident a fresh crop of new hams will do us proud at Field Day 2024.

Conclusion

In summary, we at SARC would love to hear from other Amateur Radio clubs who are considering GOTA initiatives. Let's brainstorm and share ideas that may assist new hams as they start their amateur radio journey. After all, are you really a ham if you've never pressed that PTT button? C'mon amateur radio clubs, let's season these new hams!

73,

~ Larry VE7LXB, Director
New Ham Coordinator
Surrey Amateur Radio Communications

If you would like more information on the SARC GOTA project, our Amateur Radio course, or would like to be added to our GOTA mailing list, feel free to drop us a line at gota@ve7sar.net or check out our blog ve7rsc.blogspot.com. Our GOTA Net takes place every Thursday evening at 8pm PST. VE7RSC North 147.360MHz+ tone: 110.9Hz IRLP node 1736. Our Echolink node number for VE7RSC-VHF: 496228.

[Above] Doug VE7JDJ running on N1MM+ while Manvir VA7BKI and Mike VE7YEG look on.

[Below] Father and son team Dmitry VA7DVO (logging) and his son Alex VA7PVC (calling CQ), both recent graduates of our Basic course at the GOTA station.

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News You Can't Lose

The 10 best features of amateur radio

1. **Communication:** Amateur radio allows for two-way communication across the globe, enabling operators to connect with people in different countries and even in remote locations
2. **Public service:** Amateur radio operators often provide valuable assistance during emergency situations. Organizations like Amateur Radio Emergency Services train members to work with emergency organizations, set up communication centers, and assist in rescue efforts
3. **Wireless experimentation:** Amateur radio provides a platform for enthusiasts to experiment with different radio technologies, antennas, and transmission modes
4. **Self-training:** Amateur radio operators continuously learn and improve their knowledge of radio technology, regulations, and operating principles
5. **Private recreation:** Amateur radio is a hobby that offers personal enjoyment and recreation. Operators can engage in activities like contesting, DXing (making long-distance contacts), and participating in awards programs
6. **Radiosport:** Amateur radio operators can participate in various radiosport activities, such as radio contesting, where they compete to make the most contacts within a specified time
7. **Frequency bands:** While amateur radio operators are limited to specific frequency bands, they have the flexibility to transmit on any frequency within those bands using various communication modes, including voice, text, image, and data
8. **Community involvement:** Amateur radio fosters a sense of community among operators. They can join local clubs, participate in hamfests (gatherings of amateur radio enthusiasts), and collaborate on projects .
9. **Portable and affordable:** Ham radio equipment can be portable and relatively affordable, allowing operators to set up stations in different locations and engage in the hobby without significant financial investment
10. **Friendship and convenience:** Amateur radio provides an opportunity for operators to connect with like-minded individuals, fostering friendships and social interactions. It also offers the convenience of wireless communication without relying on the internet or smartphones

Amateur radio offers a unique combination of communication, public service, experimentation, and recreation, making it a fascinating and rewarding hobby for enthusiasts worldwide.

~

Exciting news in a special edition of

Page 13—News You Can Lose

The Lighter Side of Amateur Radio

CHOTA: Amateur Radio Churches on the Air

Unleashing Pastafarian Power

Ephrata, WA. *from our correspondent*

Amateur radio, known for its creative and dedicated operators has conceived another 'OTA' event. Hams are all familiar with events, such as Parks on the Air, Lighthouses on the Air and Summits on the Air. A group of Hams has proposed adding 'Churches on the Air' (CHOTA).

https://www.amateurradio.com/chota-2023/

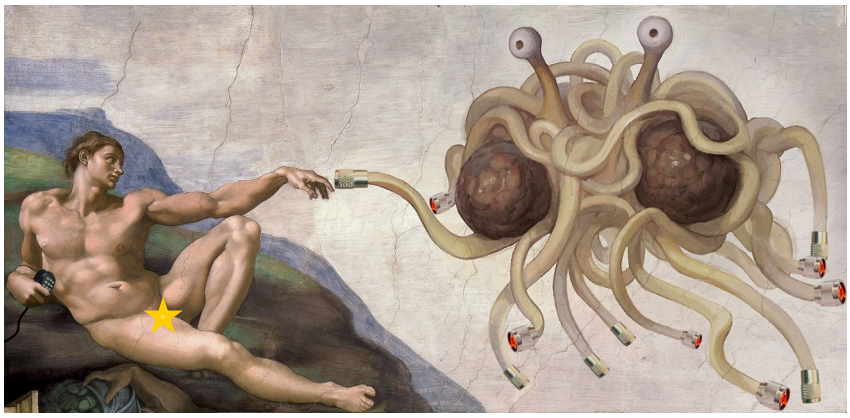
For those unfamiliar with CHOTA, it is an initiative by the World Association of Christian Radio Amateurs and Listeners (WACRAL) that aims to utilize the power of amateur radio to reach out to the public and showcase the existence of various religious institutions.

Not to be left out of new contest opportunity, hams belonging to the Church of the Flying Spaghetti Monster have proposed introducing CHOTA to their faithful. The world of Pastafarianism, complete with mesh strainer antennas, honorary conversions, and activations are limited however to participating only on their sacred day—Friday.

Church spokesperson, Al Dente, says: "all hams in our flock have experienced the tangle of a multitude of spaghetti-like wires in our ham shacks. What better way to capture the gist of Amateur Radio on those elusive radio waves than with the divine power of spaghetti?"

The Holy Symbol

The Giant Mesh Strainer Antenna. When it comes to Pastafarian-inspired amateur radio activations, a standard antenna simply won't do. Instead, devotees propose the use of a colossal mesh strainer as their sacred symbol of connectivity. Picture a giant metal



colander suspended high in the air, capturing the celestial signals blessed by the Flying Spaghetti Monster itself. The strainer antenna represents the fusion of faith and radio waves, a testament to the pasta-based deity's omnipresence, as ubiquitous as QRM and QRN.

Honorary Pastafarians

A conversion through contacts. What's a CHOTA activation without a conversion ceremony? In the world of Pastafarianism, contacts made during these unique on-air events become an opportunity for honorary conversion. Every ham who successfully establishes communication with a Pastafarian station will be welcomed into the folds of the Church of the Flying Spaghetti Monster as an honorary Pastafarian.

Of course, these conversions come with certain privileges and responsibilities. Honorary Pastafarians gain the right to wear colanders on their heads during future activations, delighting in the camaraderie and the shared belief in the divine nature of pasta. Additionally, they may be granted access to secret Pastafarian recipes, such as the revered Spaghetti with Holy Ham Sauce, passed down through generations of radio-active disciples.

Activations

The Sacred Day of Friday in the Pastafarian calendar. Fridays hold a special place of reverence. Why? Because they are the holy day when adherents gather to celebrate their faith with copious amounts of pasta.

Imagine the airwaves alive with the sounds of enthusiastic hams transmitting their faith through Morse code and voice, all while munching on delectable plates of pasta. Operators will regale each other with stories of their experiences, discussing the Flying Spaghetti Monster's divine intervention in the form of propagation miracles and mysterious interference patterns.

So, as CHOTA approaches, be prepared for an ecclesiastical revolution in the amateur radio world. Keep an eye out for the mesh colanders and colander helmets and don't be surprised if you hear the occasional "CQ CHOTA Pasta" on the airwaves.

Amateur radio has always been a place for innovation, experimentation, and a touch of eccentricity. So, grab your mesh strainer antenna, mark your calendar for a Friday, and join in the delightful madness of Pasta-inspired amateur radio activations. May the Flying Spaghetti Monster bless your waves with noodly goodness and bind you together in the universal language of ham radio.

Ramen.

~

Radio Ramblings

The "What's It?" of WSPR

And check out our next club project

by KEVIN McQUIGGIN VE7ZD / KN7Q

Welcome back from the summer break. I hope that everyone had time for some fun during the sunny and warm weather.

SARC is starting a club project with WSPR where participants will build their own special purpose HF beacon transmitters and use WSJT-X to track propagation of signals across the globe, so I thought that it would be great to write an article that explains the basics of the WSPR protocol, and how it is able to decode messages at such incredibly low power levels.

The mode clearly demonstrates the power of digital signal processing and software radios. It is amazing how a little math applied to digitized signals can allow them to be properly decoded thousands of kilometers away, even when they are transmitted with power levels on the order of a milliwatt.

WSPR

WSPR (pronounced "whisper") is an acronym that stands for "Weak Signal Propagation Reporter" [1]. It was first released in 2008 by Joe Taylor, K1JT. WSPR is included in the popular WSJT-X program and is one of eleven digital modes offered in that package [2].

WSPR is unique in that it does not support arbitrary messaging between amateur stations. Its purpose is to broadcast short messages (packets) on specific frequencies throughout the amateur bands from VLF (136 KHz) to UHF (1296 MHz), and listen for similar packets from other stations,

Kevin VE7ZD/KN7Q is active in EME, meteor scatter and much more. He lives on Vancouver Island

logging the results. The power level is selected by the user and can range from 0 dBm (1 mW) to 60 dBm 1 kW) [4]. Most WSPR users set power levels to 1 watt or less.

On the air, WSPR transmits data in USB mode using four tones to denote the individual bits in the WSPR message. This type of digital modulation is called "4-FSK". The reason for using four tones is related to synchronization and the way that WSPR data is encoded. We'll get into the details later. WSPR's TX and RX cycles are two minutes in length. This long period is key to the mode's ability to detect and decode very, very weak signals. I will describe this in some detail below.

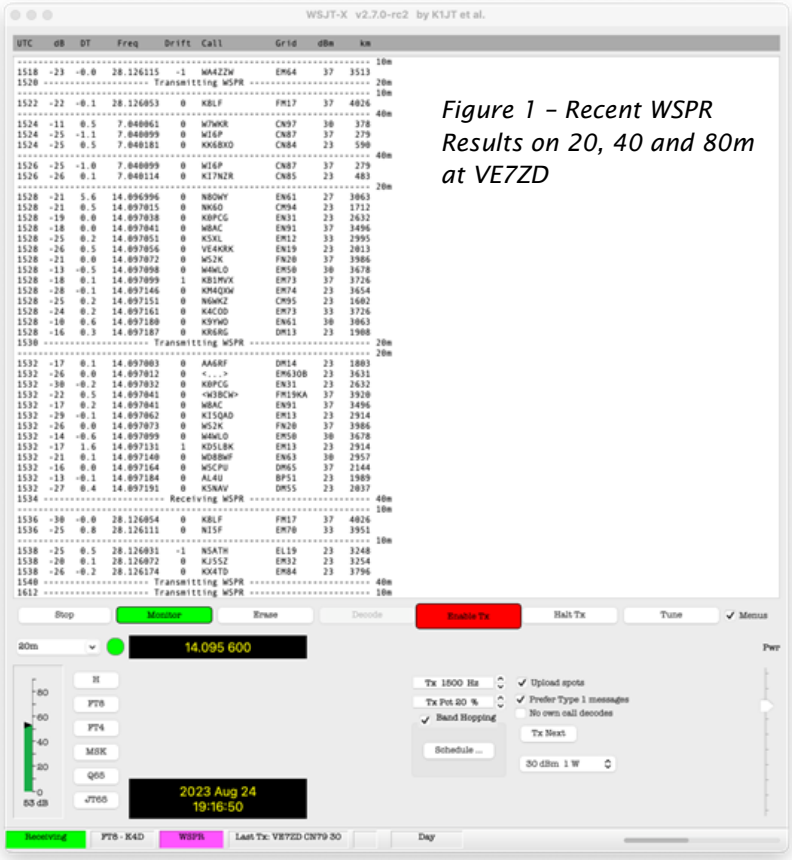


Figure 1 – Recent WSPR Results on 20, 40 and 80m at VE7ZD

WSPR can also be used in receive-only mode. In that case the application listens for packets from other stations and logs them.

Results are presented to the user in the form of a table listing received call sign, grid square, distance and received signal level. Results can also be uploaded to spotting sites on the Internet such as PSK Reporter [3]. See Figure 1 for recent results from a daytime WSPR run at my QTH. I was running 1 watt on 14.095600 MHz. On the RX side I was able to copy several stations from more than 3000 km away running 1 watt or less. The WSPR waterfall, showing several signals, is shown in Figure 2 *[next page]*.

Most users run WSPR in RX/TX mode, as it is good to contribute to other users' experimentation as well as your own. It is also fun to see how far your own signal can travel at very low power levels and still be decoded. I run WSPR here at VE7ZD periodically and have seen my 100 milliwatt signal be decoded 8000 km away!

While you can run WSPR at standard HF power levels of tens or hundreds of watts, there is more fun setting your power to a ridiculously low power level (say 10 or 100 mW) and seeing your packets decoded 1000 or 2000 km away.

Getting Started

You need to download and install WSJT-X. The latest version is 2.6.1 and it is available for download at https://wsjt.sourceforge.io/wsjtx.html. There are versions available for Windows, MacOS and Linux.

The second requirement is a rig that supports CAT control, so that WSJT-X can interface with the rig and control band and frequency switching as well as PTT. Just about any modern-era rig will work. The steps to set up your radio and

interface it to WSJT-X are fully explained in the WSJT-X User's Guide [2].

The WSPR beacon trransmitters that we will be building in the club project will be excellent radios for this purpose, and participants will be able to leave them running 24/7 to contribute to propagation measurement across the globe.

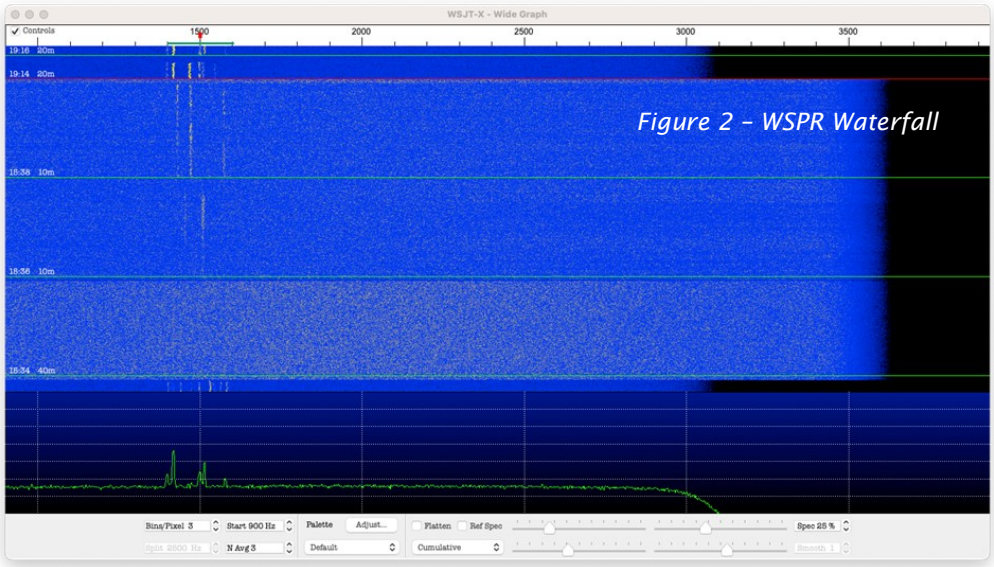


Figure 2 – WSPR Waterfall

WSPR runs as a sub-mode in WSJT-X and manages the TX and RX switching on its own. You can select the power level and frequency band or bands that the program will switch between. The WSPR section of the User's Guide (see https://wsjt.sourceforge.io/wsjtx-doc/wsjtx-main-2.6.1.html#WSPR) discusses setup and band switching.

How Does WSPR Work?

Now it's time to "take a look under the hood" and get into a bit of detail about how WSPR is able to achieve such fantastic performance in detecting and decoding milliwatt-level signals from thousands of kilometers away. It's truly amazing!

This will get a bit technical, but as with any new technology it is good to understand a bit about how it works - and WHY it works.

These technical details are a hallmark of amateur radio: as a group, hams are curious about radio in general and foundational elements of the hobby such as signal propagation. If we don't know (or worse, aren't interested in) the "how" and "why" of a technology we use, then we are no better than consumers: ignorant of the details and just interested in using a device or a service.

So, a short "spur line" into the signal processing works yard is justified and will help you understand what your WSPR transceiver is doing under the hood!

Digital Messages

WSPR messages are only 50 bits in length. Fifty bits is enough to encode:

- The sender's callsign (for example, "VE7ZD") in 28 bits;
- Their grid square (6 characters, "CN79mp") in 15 bits; and
- The station's power level, for example "0001010" for 10 dBm) in 7 bits.

Use of digital messaging is key to WSPR's success because this basic 50-bit message is not transmitted in its original form. Error correction bits and special encoding (to be described below) are added to the message. The original 50-bit message expands to 162 bits.

While at first consideration this expansion of the original message seems illogical, the benefits far outweigh the cost of adding these error detection and correction bits.

Further creative rearrangement of the bits in this message called "interleaving" (again, to be described below) further inoculates the

original message against corruption by noise or fading while in transit.

Let's get into some details about how this encoding works.

Convolutional Encoding

The encoding process used by WSPR which we are describing is similar to the encoding process that has been used by satellites and deep space probes for at least 40 years. Satellites are in orbit above our planet and provide critical communication to users on Earth [4]. Deep space probes travel far from earth and the science data that they return via radio must be protected from errors or data loss. Convolutional encoding provides this protection.

A great example are the two 'Voyager' probes, which are now beyond the solar system in interstellar space – a distance of more than 18 billion km from Earth [5]. Both probes employ convolutional encoding to provide their communications with error detection and correction capability. The Saturn probe Cassini also used convolutional encoding [8].

The WSJT-X user's guide states that "WSPR uses a convolutional code with constraint length K=32 and rate r=1/2" [2]. Let's look at what this means.

Convolutional codes provide what is called "forward error correction" or FEC. FEC provides a means not only of ***detecting*** bit errors (in the original 50-bit WSPR message) but ***correcting*** those errors as well. It does this by applying a "parity function" to successive groups of bits in the original message.

What is a parity function? A parity function looks at a group of bits and ***counts the number of bits that are set to 1***. If the number of 1 bits is even (0, 2, 4, 6, etc.) then the function returns 0. If the number of 1 bits is odd, then the parity function returns 1.

A couple of examples will help:

- The group of 4 bits 0101 has two 1 bits in it, so the parity function would return 0;
- The group of five bits 01011 (or 10011, or 10110 – you "get it!") has 3 1 bits, so the parity function would return 1 for any of these groups of bits.

So now we understand what parity and the parity function means. This is key to convolutional encoding.

There's an amazing result coming up shortly. Read on!

The parity function acts on the 50 bits of the original WSPR message. It doesn't calculate parity on all 50 bits at once, but rather it "steps through" the fifty bits of the message, considering 32 bits at a time. This is what the term "constraint length K=32" means in the description of the WSPR protocol.

Parity is generated on the first 32 bits (bits 1 to 32, counting from the left) of the original message. Then an additional parity function is computed on bits 2 through 33. Next, bits 3 through 34 are considered, then bits 4 through 35, and so on until the end of the 50-bit original message is reached. As you can envision, each 32-bit subset of the bits in the original WSPR message – the message that contains the callsign, grid and power level – is considered separately and a parity bit generated.

Stepping Over a Bit of Complexity

Now we will "hand wave" over a bit of complexity:

- There are actually TWO parity bits generated for each of the 32-bit segments (or "windows") in the original message
- These two parity values may differ because they consider different sets of bits in the 32-bit window

- Why two parity bits? It's because of mathematical factors that indicate statistically that two bits is "enough" for good performance of the convolutional encoding algorithm. No need to get into that detail here!
- The other factor that we need not consider is that the original 50-bit message gets padded on the left and right with 31 0s to ensure that each bit gets an equal amount of time in the 32-bit window from where the two parity functions are calculated.

The "executive summary" is that two parity bits are calculated for each 32-bit subset of bits in the original 50-bit message. Remember the WSPR protocol description: "WSPR uses a convolutional code with constraint length K=32 and rate r=1/2"? The "rate=1/2" means that 2 parity bits are generated for each 32-bit (K=32) window.

With a 32-bit window moving through a 50-bit message and generating two parity bits per step, how many parity bits will be generated in total? The answer is (50 + 32—1)*2, or 162 bits.

The "Reveal"

Here is the amazing part:

After convolutional encoding, the WSPR message transmitted on HF or VHF consists entirely of the 162 parity bits that were generated by the encoding process.

None (ZERO!) ***of the original message bits get transmitted*** – only the parity bits that were generated from the original message! Somehow (see below), transmitting just the parity bits allows us to reconstruct an error -free original 50-bit message.

Neat, isn't it?

Convolutional encoding transmits messages not by transmitting the actual message bits, but by counting bits, calculating parity, and sending that stream of parity bits (only the parity bits) over the air. The bit stream is received by another WSPR station, or by the Deep Space Network (DSN) when the encoding is done by Voyager 1 or Cassini, or through the satellite dish on your roof that is streaming DirecTV to your living room.

The power of this encoding process allows messages that are received with errors to have those errors detected and corrected with a large percentage of success. We will look at decoding of 162-bit WSPR packets only very briefly below.

Some Loose Ends

There's another step in the preparation of WSPR packets for transmission that I would also like to cover briefly. It is called "interleaving" and it's a clever method of insulating messages in transit from noise.

As we all know from our amateur radio operation (more so for experienced HF operators), noise is a problem when trying to receive information from other operators during a QSO. Noise is random, although it can be man-made as well. Nonetheless, it can be characterized as a periodic disruption that comes and goes. The period in which it comes and goes may range from seconds to milliseconds. Our job when we are operating the station personally is to be able to listen "in between" noise bursts and extract CW symbols or the voice of the other operator from the noise and make sense of it to recover the original message.

Interleaving is a method of reducing the effect of periodic real-world interference with digital messages.

The way it works is by transposing the digital message and rearranging the message bits so that the sequential bits of each character (byte) in the message are not all sent in sequential order. This sounds complicated, so it is best illustrated by an example. We will use a short

message of eight characters (8 bytes) to demonstrate how interleaving works.

Our example message will be "HI KEVIN". Let's convert it to binary [6]. I'll make each byte a different colour for clarity. The binary message is:

```
01001000    H
01001001    I
00100000    (blank)
01001011    K
01000101    E
01010110    V
01001001    I
01000111    N
```

For convenience, I have shown the corresponding ASCII characters on the right. The full message as transmitted sequentially would be:

```
0100100001001001001000000100101101000101010101100100100101000111
   H       I     (blank)     K       E        V        I        N
```

If we transmitted this message bit by bit and a short noise burst interfered, then we would probably lose (for example) a single character (say, the K) in the message. FEC (forward error correction) can detect and correct some errors, but a loss of say 5 or 6 bits in a message will make the original character unrecoverable. How does interleaving help?

The interleaving process transposes the message ("flips" it around the Y-axis) and reorders the bits in the message from left-to-right, to top-to-bottom. It's a simple process in software. What? Let's interleave our message bits from above. Transposition gives the sequence left.

```
00000000
11011111
00100000
00000100
11010010
00000101
00011101
01011011

HI KEVIN
```

Note how the text has been transposed and that each character is now encoded top-to-bottom in the message. The bits will still be transmitted top to bottom, left to right.

After interleaving, the message transmitted will now be:

```
000000001101111100100000000010011010010000001010001110101011011
```

This interleaved data frame has the same content as the first message, but you can see by the colours that the bits in each byte have been distributed not next to one another as in the original message, but throughout the entire length of the message that is transmitted. A noise burst that takes out 5 or 6 successive bits in the data frame will now not impact 5 or 6 bits in a single character, but rather 1 bit in 5 or 6 different characters. FEC can easily recover a byte that has only one bit error!

Interleaving has thus insulated our message from noise bursts, and FEC will be able to recover from any bit errors caused by noise during reception.

WSPR interleaves the 162-bit encoded message before it is transmitted, just for this reason.

Interleaving (and de-interleaving) can be easily done in software, so it is a very common technique that is used not only in WSPR but also in conjunction with convolution encoding in just about every weak signal environment. Satellites and deep space probes invariably interleave their data streams to protect messages against noise.

Decoding

WSPR packets which are received must first be de-interleaved to recover the original bit order of the 162-bit message. This is easily done in software as well.

Once de-interleaving is complete, then the original 50-bit WSPR message can be recovered from the transmitted parity bits using an algorithm that builds up the original message from successive

combinations of the 162 parity bits. It is a bit complicated and involves a virtual data structure called a "trellis" [7]. Suffice it to say that the process works, and while there is a statistical (guessing) factor involved in the case of received bit errors, the original 50-bit WSPR message can invariably be recovered without error.

Once the original 50-bit message has been decoded, WSPR logs the packet and updates the user's computer screen. The detection may also be uploaded to PSK Reporter or another online propagation tracking service.

Transmission Details

There's one important detail we still need to consider. What you may have noticed is that our entire discussion so far has been related to how the 50-bit WSPR messages are encoded before transmission, and how the 162-bit packets received are decoded back into the original 50-bit message.

It has been a conceptual and mathematical exercise: we took 50 source bits and manipulated them to introduce noise immunity and bit error detection and correction. This manipulation transformed the original message into a 162-bit packet that can be decoded by the receiver to recreate the original message. We never discussed how these packets are actually transmitted and received on the HF/VHF/UHF bands using physical radios and antennas.

How does WSPR get the encoded packets from A to B?

In the introduction I noted that WSPR uses "4-FSK" (four tones) to transmit messages using USB mode on an amateur transceiver. Let's look at this in a bit of detail.

The four tones (audio frequencies) represent two bits each. A two-bit binary number can range from 00 to 11. There are four combinations of bits, as shown in Table 1.

Bit Values	Decimal Value	Audio Tone Value (Hz)*
00	0	100
01	1	200
10	2	300
11	3	400
** 100-400 Hz used for the example only; these are not the actual tones used by WSPR but will serve us well in the explanation!*		

Table 1 – Mapping 2-bit Binary Values to WSPR Audio Tones

You may be getting the idea: we can transmit the 162 bits in the WSPR packet two at a time by mapping each pair of bits to a tone, and then transmitting that tone. We then move on to the next two bits, transmit the next tone and step through the packet in this way until the whole packet has been sent. 162 divided by 2 is 81: we can transmit the entire packet in 81 tones.

WSPR messages are sent and received in a two-minute (120 second) time slot, so the timing for each tone would be 120/81 or 1.481 seconds. If we send each of the 81 tones for 1.481 seconds, then we can fit 81 tones (representing 162 bits) into the 120 second transmit time slot. On receive we decode the tones, convert to two bits each, and we will have a complete 162-bit packet.

If you see this, then you are on the correct road!

However (isn't this usually the case with complex technologies?) there are some problems with this approach. For this methodology to work the sender and receiver's time clocks must be closely synchronized: the receiver needs to know when each 162-bit packet starts in order to be able to correctly recover the sent message. If the receiver's clock is off even by one tone slot (1.481 seconds) then the whole system will fall apart, and the received packet will not decode correctly.

Some of this is handled by the requirement (see the User's Guide [2]) that both stations

have an accurate clock so that they are within a couple of seconds of each other. This is the same requirement as users have for FT8, FT4, Q65 and other digital modes. This method isn't infallible though, so WSPR and other systems which use convolutional encoding introduce another feature that will definitively ensure that the receiver is able to correctly "lock" onto the start of the 162-bit packet.

It's quite clever, so let's talk about how this synchronization works.

All WSPR stations share what's called a "unique word" (UW) that is piggybacked on the 162-bit packet to ensure synchronization. This UW is a random series of bits, 162 bits long, and it never changes, even between WSPR software releases. The UW is the key to being able to detect the start of a WSPR packet. The actual value of the UW doesn't matter – the point is that every WSPR station knows it.

It works like this:

Each of the 162 bits of the WSPR packet is paired up with the corresponding bit of the UW. This means that the number of bits that WSPR must transmit in the 120 second time slot doubles: 162 x 2 equals 324 bits. This seems non-sensical at first, but we will see why it is so clever! Here's an example (Table 2) using an 8-bit UW and data packet for brevity:

Packet bits:	10110111
UW (random bits):	01001010
Pairing of UW with packet bits:	1001101001101110

Table 2 – Illustration of UW Interleaving

Note how each packet bit has been paired with the corresponding bit of the unique word. The bits interleave, with the data bit always coming first, followed by the corresponding bit of the UW.

An apparent disadvantage of this is that the size of the packet to be transmitted doubles in length.

The 324-bit packet (now loaded for transmission!) is converted to 162 tones when it is transmitted two bits at a time using 4-FSK as we understood above. The "seconds per tone" will need to reduce from 1.481 seconds by one half as well; 120 seconds divided by 162 tones gives a new figure of 0.7407 seconds per tone.

The 324-bit packet is then transmitted. A series of four tones (100 – 400 Hz in our example) will be transmitted using USB with each tone lasting 0.7407 seconds. In a 120 second time slot, 162 tones (representing 162 data bits and 162 UW bits) will be transmitted.

Reception

Assume a clear channel and that the 324-bit WSPR packet is received without error. How does the UW allow the receiver to synchronize on the start of the transmitted packet?

I'll hand-wave a bit here as well for brevity, but it is enough to say that because the receiving side (the receiver's WSJT-X installation) shares knowledge of the UW (unique word – the 162-bit random series of bits) that it can use this knowledge to determine the start of the 162-bit data packet and then work as described above to decode the original 50-bit message.

The idea of using a UW was a great idea because it solves the problem of synchronization between sender and receiver. As an aside, the same approach is used on communication satellites and deep space probes [10].

Think of the UW as a "skeleton key" or a "leg up" into the received bits of the data stream that the receiver can use to determine the correct starting point of the packet. Once the 324 bits are lined up with

the correct starting point, the UW bits are removed (leaving a 164-bit interleaved, convolutionally-encoded packet), and then the decoding process described earlier is used to recover the original 50-bit WSPR message. It gets displayed and logged, and the receiver cycle is complete.

Summary

WSPR is an example of a digital mode that is simple conceptually but that has an awful lot of complex stuff going on under the hood.

The complexity of WSPR's implementation is the reason why it can detect such weak signals: signals that you cannot hear when you turn up the receiver's audio, or even see on the waterfall display. WSPR can decode signals 39 dB (10 ^ 3.9 or 7943 times) below the threshold of intelligibility for SSB voice signals, and 11 dB (10 ^ 1.1, or 12.6 times) below the threshold of a CW signal [11].

This incredible sensitivity is a fair trade-off for the mode only being able to support basic messages, and WSPR beacons can contribute greatly to the study of global propagation on the amateur radio bands.

As members of the club get involved in the WSPR beacon project this fall, I hope that this article will serve to give everyone some background into how the mode works. As amateurs we should understand the technologies we use. A working knowledge of how WSPR works will enhance your understanding and keep you abreast of modern amateur radio technology.

Conclusion

That's it for this issue. Feedback, including questions on this article can be directed to the Editor, or directly to me at mcquiggi@sfu.ca. Thanks for reading!

73,

~ Kevin VE7ZD / KN7Q

(Continued on page 24)

Social Reminder

The Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5756—142 Street, Surrey from 10-noon.

Bring your ham issues, our Elmers will try to help you sort them out.

References:

[1] An overview of WSPR is available at https://en.wikipedia.org/wiki/WSPR_(amateur_radio_software).

[2] WSJT-X User's Guide, version 2.6. See https://wsjt.sourceforge.io/wsjtx-doc/wsjtx-main-2.6.1.html#INTRO.

[3] See https://pskreporter.info. PSK Reporter should be a go-to web service for all amateurs: it allows you to track propagation worldwide!

[4] We certainly would not want our movie streaming to pixelate, or our Internet access to be garbled!

[5] Mission specifications and status are at https://voyager.jpl.nasa.gov/.

[6] I used the common 'hexdump' utility (see https://linux.die.net/man/1/hexdump) to perform this translation from ASCII to binary, but you can also visit the handy and free converter https://www.convertbinary.com/text-to-binary/ to convert text to binary at your convenience.

[7] There is an excellent article that goes quite deeply into weak signal modes, the use of FEC and convolution codes at http://www.472khz.org/pages/technical-topics/weak-signal-modes/forward-error-correction-fec.php. Be prepared to read the article several times, especially in regard to the discussion of Viterbi decoding and the "trellis"! Thanks to Rik, ON7YD for putting all this information together in one place.

[8] Both Voyager probes employ convolutional encoding with a constraint K=7 and a rate R of 1/2. The details of their encoding are slightly different from that of WSPR, but the foundational techniques are essentially the same. The Saturn probe Cassini also used convolutional encoding during its 19-year mission, in this case with K=15 and rate R=1/6. Cassini was intentionally de-orbited and burned up in Saturn's atmosphere in 2017 [9]. See http://www.spiral.net/software/viterbi.html for free software to generate your own decoder for just about any type of convolutional code. Expect a bit of a learning curve to get your decoder working, however!

[9] See https://en.wikipedia.org/wiki/Cassini%E2%80%93Huygens.

[10] I wrote a convolutional decoder for the geostationary "Inmarsat" satellites around 2015 and the unique word plays a key role in finding the start of telemetry packets. It took me a couple of months to get the decoder debugged, but it works well to this day.

[11] See http://www.pa3fwm.nl/technotes/tn09b.html for a discussion of weak signal detection and a comparison of the weak signal performance of both analog and digital modes.

In researching a topic I found your website.

1st of all, I found the "The Communicator" to be great and what a publication for Ham's should be. The fact that it is made free to the Ham Community is a great service. I congratulate your group/club! I will pass it on to my club's members.

73,

Gary H White K2KKB

K7JEP.org - Bonner County Amateur Radio Club

SARC's next project

Unlocking the world with WSPR: The 5W Beacon Project

A collaboration between French and Canadian Amateur Radio enthusiast and SARC

by PIERRE F6IDT and DINO VE7NX

Following up on Kevins preceding explanation, this article highlights a remarkable achievement—a collaboration between French and Canadian ham radio enthusiasts and SARC, and an extension of the 200mW WSPR beacon at F6IDT's website: http://www.rotilom.com/F6IDT/. The project was developed through a partnership between Dino VE7NX, a local radio amateur, and Surrey Amateur Radio Communications (SARC), a prominent Amateur Radio club in the southwest corner of Canada, this upgraded version will be available as a kit to our Advanced level members early next year. In this article, we delve into the features of this beacon, the collaboration behind it, and its potential impact on the international amateur radio community.

Amateur radio enthusiasts around the world are always on the lookout for innovative ways to push the boundaries of their hobby. Imagine sitting at your computer, or even your handheld device, and being able to see 'live' where your low-power transmitted beacon is being heard across the globe. Thanks to a remarkable collaboration, this dream has become a reality with their enhanced 5W beacon project.

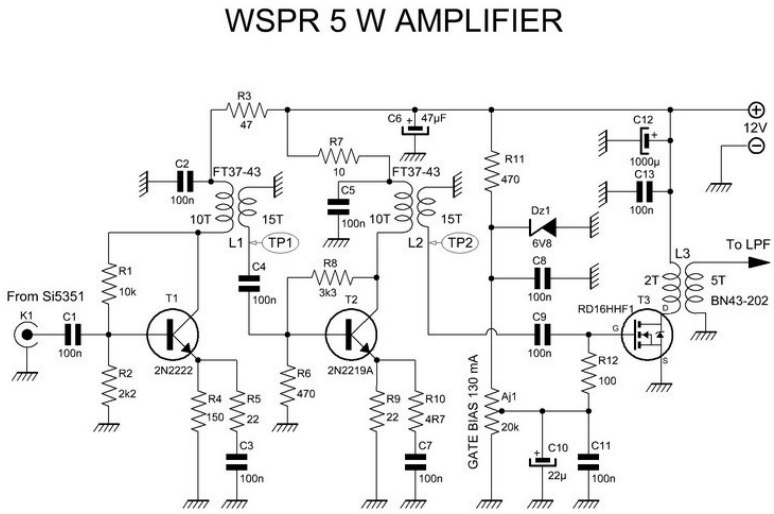
At the heart of this achievement lies WSPR, which stands for Weak Signal Propagation Reporter. Developed by Joe Taylor, K1JT, WSPR is a protocol and computer program designed for weak-signal radio communication between amateur radio operators. The protocol allows for low-power transmissions of 5 watts or less to test propagation paths on Medium and High Frequency bands. WSPR transmissions contain a station's callsign, Maidenhead grid locator, and transmitter power, and they can be decoded with an astonishingly low signal-to-noise ratio of −28 dB in a 2500 Hz bandwidth. Receiving stations with internet access can upload their reception reports to WSPRnet, a central database that includes a mapping facility.

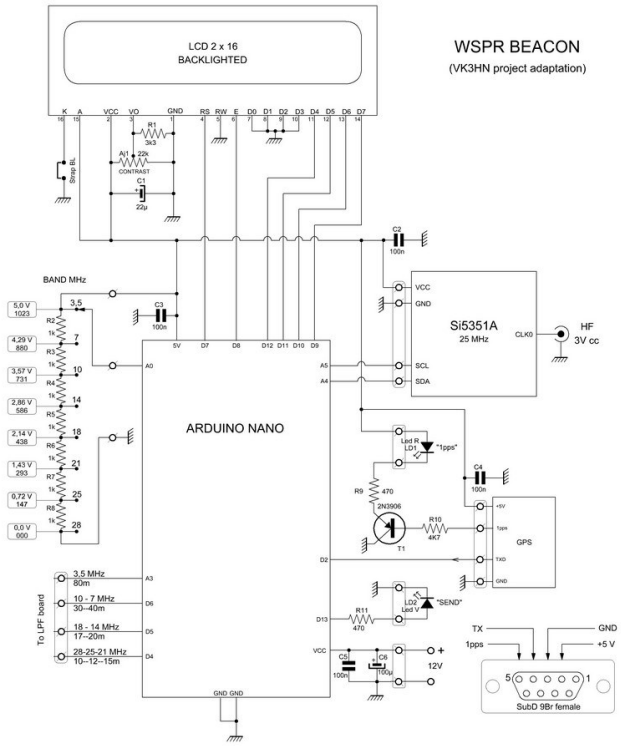
Acknowledging VK3HN's Contribution. It is important to acknowledge the foundational work of VK3HN, which served as the basis for this project. The original program containing the essential operational elements was adapted for this version.

The project's beacon, an extension of Pierre F6IDT's 200mW beacon, takes WSPR to new heights. The notable enhancement in this beacon is its power, which has been increased to 5 Watts. However, its adaptability to different scenarios is equally remarkable. Users can choose between automatic frequency selection or continuous scanning of amateur radio bands. To accommodate this flexibility, the beacon is equipped with an 8-position switch that covers the 8 main HF bands, including WARC, ranging from 3.5 to 28 MHz. For those desiring an automatic scan of bands (band hopping), this alternate mode for the Arduino Nano is available by flipping a switch. Presently, the five main bands switch every ten minutes, but users can modify the program to select a different cycle.

Due to the nature of MOSFET inputs, the power output varies across different bands. While the beacon can deliver 5W at 3.5 MHz, the power decreases to 2W at 28 MHz. Consequently, the power indication in the program, measured in dBm, should ideally be modified according to the selected band. However, this adjustment has not been implemented but can be carried out if desired.

After creating a fully functional mock-up, the project team generated Gerber and Excellon files using Sprint Layout 6 software. The resulting circuit boards were manufactured by JLCPCB in China, with a minimum order quantity of 5 sets. With one set already used for control, four sets are available. Each pack, comprising seven circuits, is priced at 16 euros.





Expanded views and the circuit board layout can be seen at http://www.rotilom.com/F6IDT/balise_wspr-5w.htm

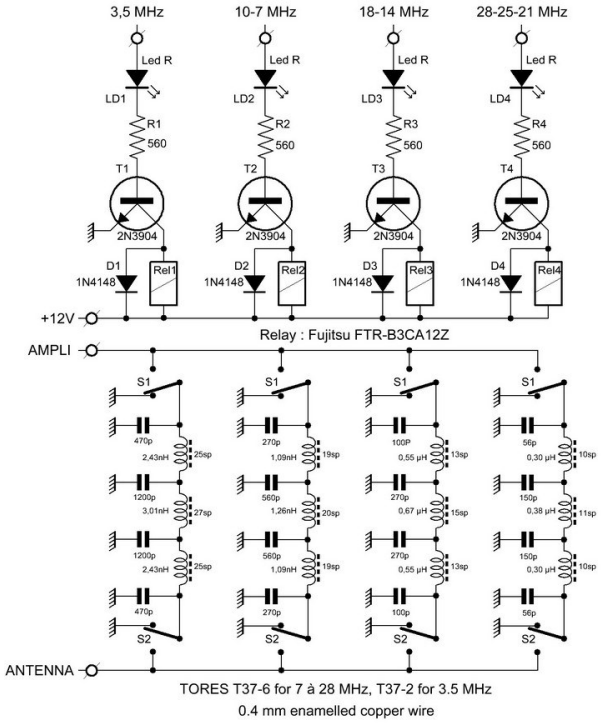
The package also includes two Arduino programs, diagrams, printed circuit board drawings (in PDF or original file format), a component list, wiring plan, and potentially additional files for manufacturing other circuits.

Considering the challenges associated with boxes and markings, the team recommends the HAMMOND 1455U1601 model, readily available from https://www.mouser.com/. Additionally, DYMO labeling is recommended for clear and professional markings.

To ensure the frequency BF falls within the narrow range of 1400 to 1600 Hz, it is crucial to calibrate the Si5351 module. This can be accomplished using a frequency meter and the si5351_calibration.ino software, located in the "examples" directory of the Si5351 library. For ease of use, it is possible to substitute 10 MHz with 14 MHz during the calibration process.

When selecting capacitors for low-pass filters, it is recommended to opt for ceramic multilayer capacitors (MLCC) with NP0 and 5% specifications. Ordinary ceramics are not suitable for this purpose.

LOW PASS FILTERS



As this is a transmitter not available from a commercial manufacturer, Canadian regulations permit only club members with the required Canadian Advanced qualification to build the kit. The beacon kit, developed with off-the-shelf modules for simplicity, comprises seven circuits and includes two Arduino programs, diagrams, printed circuit board drawings, components, and a wiring plan. This move aims to empower more individuals to join the amateur radio community and explore the exciting possibilities of weak-signal radio communication.

The collaboration behind this project is truly international, with Pierre from France, Dino from Canada, and the support of Surrey Amateur Radio Communications in Canada. SARC, well-known for its active engagement in the amateur radio community, fosters a developmental environment for like-minded individuals interested in amateur radio and electronics projects. The collaboration between Pierre, Dino, SARC, and the wider amateur radio community has fostered a remarkable level of cooperation within the WSPR community.

The 5W beacon project opens new doors for amateur radio enthusiasts, offering increased power and adaptability in propagation testing. As more individuals join the ranks of amateur radio operators, thanks to the availability of the beacon as a kit, the international amateur radio community may witness exciting developments and breakthroughs in weak-signal radio communication. With this beacon, the whisper of radio waves can carry messages across continents, connecting people with shared interests and a passion for pushing the boundaries of radio communication technology.

~ Pierre F6IDT, translated by Google, Dino VE7NX, and edited by John VE7TI

A Unique Radio Club Buildathon

If your club is looking for something new, versus just another meeting, I encourage them to consider holding a Buildaton.

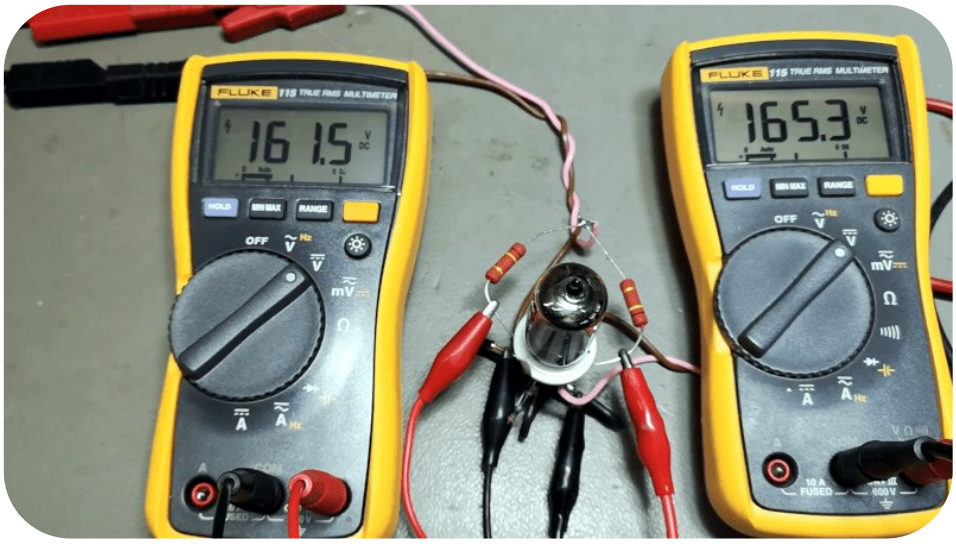
While a club Buildathon is nothing new, and many clubs have had them within our ARRL Section and beyond, the one hosted by Cowtown Amateur Radio Club (CARC) of Fort Worth, Texas, was successful because it provided members with something they could get their hands on, interact with, and continue to enjoy.

Watch the YouTube video, "ADX-Digital Transceiver - Cowtown ARC Buildathon Success!," by Richard, W5ARH, to learn more about the ADX digital mode transceiver designed by Barbaros Asuroglu, WB2CBA, that CARC members built, and how your club might do the same or something like it.

CARC President Dave Martin, K5YFO, stated that this Buildathon was successful because of the impressive support by Richard, W5ARH, and Barbaros, WB2CBA; it promoted on-the-air activity for all licensed members; it offered comradery; it was fun, exciting, and inexpensive (less than $35 per participant), and it was a practical and useful transceiver that members can use and enjoy.

The video can be viewed at https://youtu.be/VrkioM_xv6s.

~ Dave Martin, K5YFO



Roll your own simple tube tester

by HACKADAY / AL WILLIAMS

You can easily get carried away when trying to test things. For example, if you want to know if your car is working, you could measure the timing of the ignition and put the car on a dynamometer. Or you could just start it and figure that if it runs and moves when you put it in drive, it is probably fine.

When [Thomas Scherrer] wanted to test some tubes, he made the same kind of assumption. While tubes can develop wacky failure modes, the normal difference between a working tube and a failing tube is usually not very subtle. He made a simple test rig to test tubes at DC and one operating point. Not comprehensive, but good enough most of the time. Have a look at what he did in the video below.

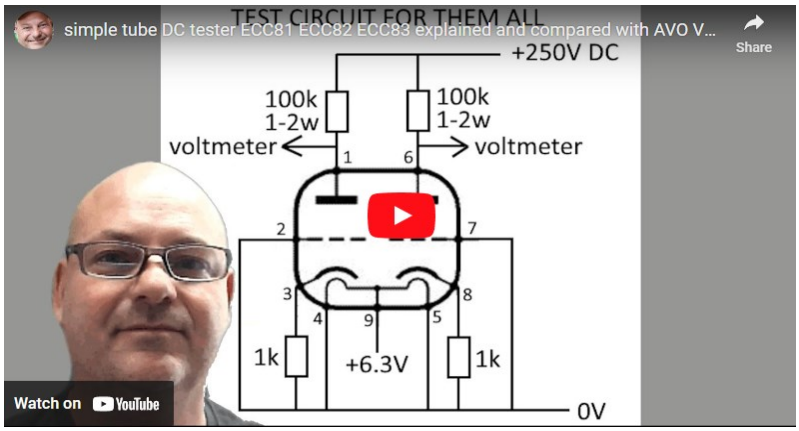
The tester is just a few resistors, a tube socket, and some bench power supplies. Of course, you may have to adapt it to whatever tube you are testing. If we had a lot of tubes to do, we might make the rig a bit more permanent, but for an afternoon of testing, what he has would be fine.

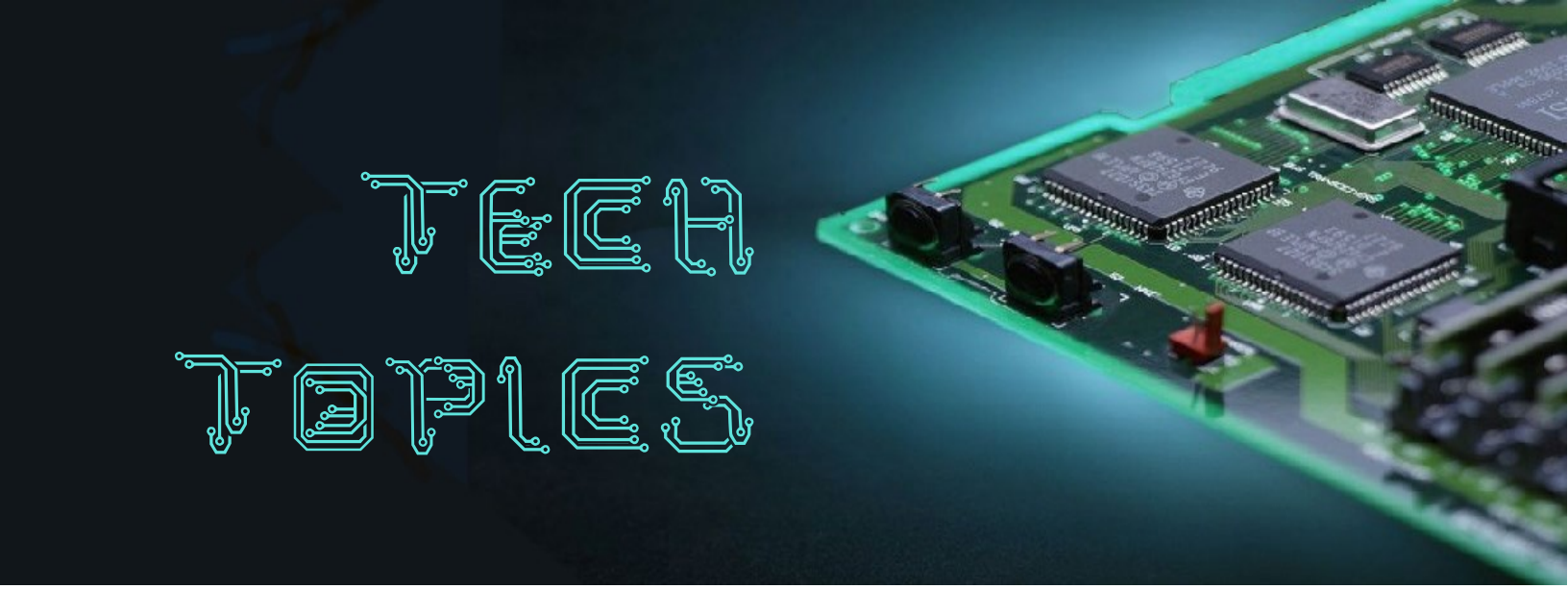
In addition to the power supplies, you'll need at least one, preferably two, volt meters. He was able to validate his results with a proper tube tester. The results matched up well. While this won't solve all your tube testing problems, it will give you a quick start.

You can build your own modern tube tester, of course. Or pick up a vintage one. Our favorite one uses punched cards.

~ Hackaday / Al Williams

Roll Your Own Simple Tube Tester |





Prolonging the Life of Portable Amateur Radio Transceiver Batteries of Different Chemistries

by John Schouten VE7TI

Portable amateur radio transceivers play a crucial role in enabling communication for radio enthusiasts, emergency responders, and outdoor adventurers. These devices rely on batteries to provide the necessary power for seamless operation. To maximize the longevity of your portable amateur radio transceiver's battery, it's important to understand the specific chemistry employed by different battery types. In this article, we will explore effective strategies for prolonging the life of batteries using various chemistries commonly found in portable amateur radio transceivers.

Lithium-Ion (Li-Ion) Batteries

Lithium-ion batteries are widely used in modern portable amateur radio transceivers due to their high energy density and lightweight nature. To extend the life of Li-Ion batteries:

- Avoid Full Discharges: Fully discharging Li-Ion batteries can be detrimental to their lifespan. Aim to recharge the battery before it reaches critically low levels, preferably when it reaches around 20-30% capacity.
- Moderate Charging: Charging Li-Ion batteries at a moderate pace is recommended. Rapid charging may generate excess heat, which can compromise the battery's

health over time. Utilize a charger specifically designed for Li-Ion batteries and avoid charging at extremely high currents.

- Temperature Considerations: Li-Ion batteries perform optimally within a specific temperature range (usually between 15-25 degrees Celsius). Avoid subjecting the battery to extreme temperatures, as excessive heat or cold can cause irreversible damage.

Nickel-Metal Hydride (NiMH) Batteries

Although less common in modern transceivers, NiMH batteries are still found in some portable amateur radio devices. To extend the life of NiMH batteries:

- Memory Effect: NiMH batteries are prone to the "memory effect," a phenomenon where the battery gradually loses capacity if consistently recharged without being fully discharged. To prevent this, occasionally discharge the battery fully before recharging it.
- Sensible Charging: Use a charger specifically designed for NiMH batteries to prevent overcharging. Avoid leaving the battery plugged in continuously after reaching a full charge.
- Ambient Temperature: Similar to Li-Ion batteries, maintaining moderate temperatures (around 15-25 degrees Celsius) is beneficial for NiMH batteries. Extreme temperatures can negatively impact their performance and longevity.

Nickel-Cadmium (NiCd) Batteries

While less common today due to environmental concerns, some older portable amateur radio transceivers still utilize NiCd batteries. To maximize the life of NiCd batteries:

- Memory Effect: Similar to NiMH batteries, NiCd batteries are susceptible to the memory effect. Fully discharge the battery occasionally to mitigate its impact and maintain capacity.
- Proper Charging: NiCd batteries require specific charging protocols. Use a charger specifically designed for NiCd batteries, as improper charging methods can lead to reduced battery performance and capacity.
- Temperature Control: NiCd batteries perform optimally at moderate temperatures, similar to the other chemistries mentioned. Extreme temperatures can affect their performance and longevity, so avoid exposing them to excessive heat or cold.

General Tips for Battery Maintenance

Regardless of the battery chemistry, implementing these practices will help maximize the lifespan of your portable amateur radio transceiver's battery:

Avoid Extreme Temperature Exposure: Protect your transceiver and battery from extreme heat or cold, as it can damage battery cells and shorten their lifespan.

Store Batteries Properly: If storing the transceiver for an extended period, remove the battery and store it in a cool, dry place with a charge level between 40-70%.

Regular Usage: Regularly use and exercise the battery to prevent it from remaining unused for prolonged periods, which can cause capacity lossand deterioration.

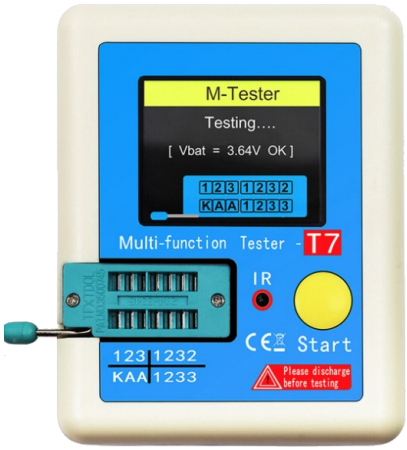
Use Official Batteries and Chargers: Whenever possible, use batteries and chargers recommended by the transceiver manufacturer. This ensures compatibility and optimal performance.

Be Mindful of Charging Time: Avoid leaving your transceiver plugged in for extended

periods once it reaches a full charge. Unplug it or use a charger with smart charging capabilities that can prevent overcharging.

Prolonging the life of portable amateur radio transceiver batteries requires understanding the specific chemistries employed in different battery types and implementing appropriate maintenance practices. Whether you have a lithium-ion, nickel-metal hydride, or nickel-cadmium battery, adhering to guidelines such as avoiding full discharges, proper charging, temperature control, and regular usage will help optimize the lifespan of your battery. By implementing these strategies, you can ensure that your portable amateur radio transceiver is always ready for reliable communication in various settings.

~ John VE7TI

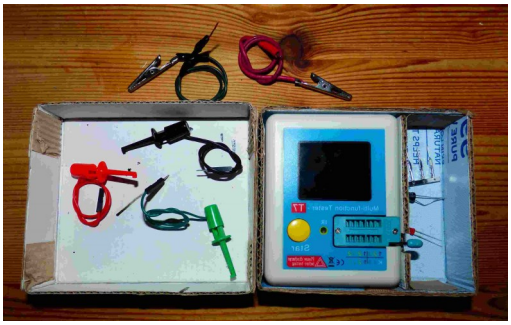


Test equipment for the casual constructor

Nifty functionality

by GERRY

Thank you for the latest copy of the SARC magazine… excellent contents this time around! Even though I am not a radio ham, I have an interest in "messing about", mainly with crystal sets, although a long time ago I did dabble in construction of a mains PSU and a three valve TRF, which, when I got it working, was almost as good as my Eddystone 750 for reception of DX. I seem to recall there was less RF noise on the TRF!



Anyway. my test equipment back then was basically, plug it in and see if it works, if not try the fuse and check it with the only instrument I had… a multimeter! I got by. I did make some small test boxes for transistor testing, and also one for capacitance testing which did not really justify the effort, as I only used them one or two times.

I'm 78 now, and have limited funds and no workshop space, but still like to mess with crystal set and home made coils to see "what I can get" so, I have a box of junk that I have accumulated over the years, and was sorting through some old variable tuning capacitors, old 1940's ex valve radio

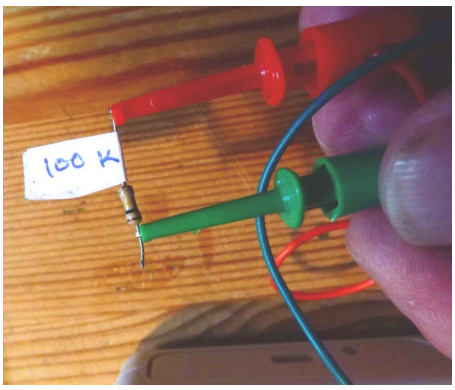
coils, etc and wondering what their values were, and if I could use them. I came across a circuit, that specified, a certain value, working against (or with) home brew coils, which were specified in mH units. as well as number of turns on a former; what it did not specify was the wire gauge, which I thought would make a difference.

I wondered if there was a commercial test unit that was reasonably cheap, to test for capacitance value, and started a search on eBay, and yes, there is. I found this eBay item [or AliExpress]. I was quite pleased with the things that it tested, and made a cardboard container, so I could keep it "safe" and easier to handle.

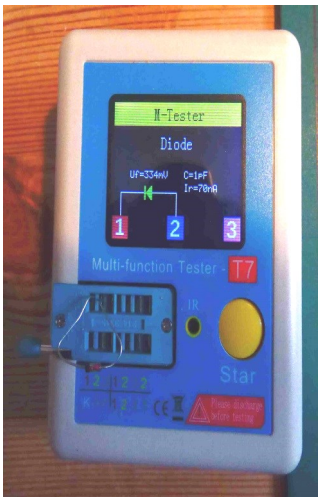
After about a week of use, the cardboard box was looking a bit rough, and so I went back on eBay to see if there was anything a bit better and found this eBay item number:394562746690.

The first one is entitled T4, and the last one is entitled T7, much improved with the whole package in a plastic casing. And it came with a LED and an electrolytic capacitor, to use as testers.

Something that was missing though, an instruction leaflet! However. it is relatively simple to work out that if you plug something in to the 1 hole and also the 2 hole. It shows on screen what you have connected to, and also what it is you are testing and the values accordingly (both units did that).



The unit comes with three unique test leads, with an interesting "pull back" grabber, and a hook to hook on to the wires of components however, I made up a pair of small croc clip test leads, as they are needed for various operations like testing the variable capacitors or the solder connections on the home brew coils.

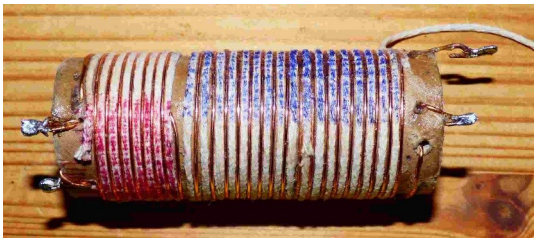


There are two rows of holes; the lower row has the designation K A A for the first three holes, and you would use these for testing Zener diodes and also you can test LED's to see if they are "good" or "working". If you plug them in the right way, they light up, if they don't light up, reverse the way you plug them in! If it doesn`t light up either way, it must be duff.

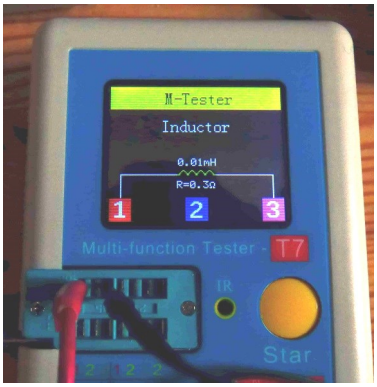
for Diode testing it even shows you which way round it is inserted, so you get the correct polarity

Going back to the homebrew coils. You can find out the H value with this tester. It can be a bit "hit and miss" at times, where it will show it up as a resistance. This may be because the battery needs charging up. (the T7 is a USB rechargeable unit) (the T4 needs a 9v battery). It may also be because the connection

ZENER DIODE testing in the KAA slots.



Home brew coil. Note... the string between the windings is the way that I ensured an even spacing for the windings. The colouring is to identify each coil.



Here is how it showed up on the tester .

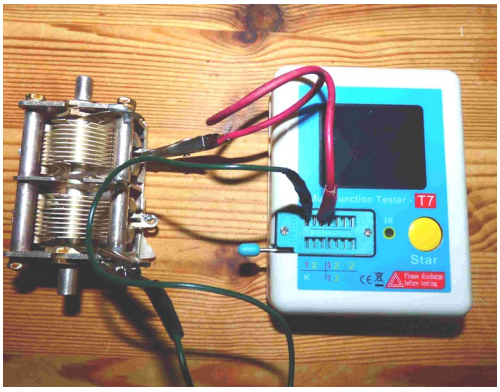
point is dirty causing a resistance to be read.

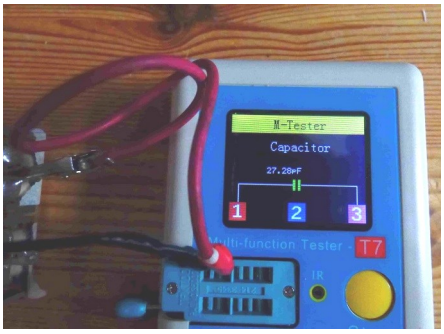
All in all, a nicely packaged piece of test equipment for the casual constructor like me. (It is worth paying "that bit extra" for the T7 version).

I am not affiliated, in any way, with this product, I just thought it might be something that you could put in your magazine.

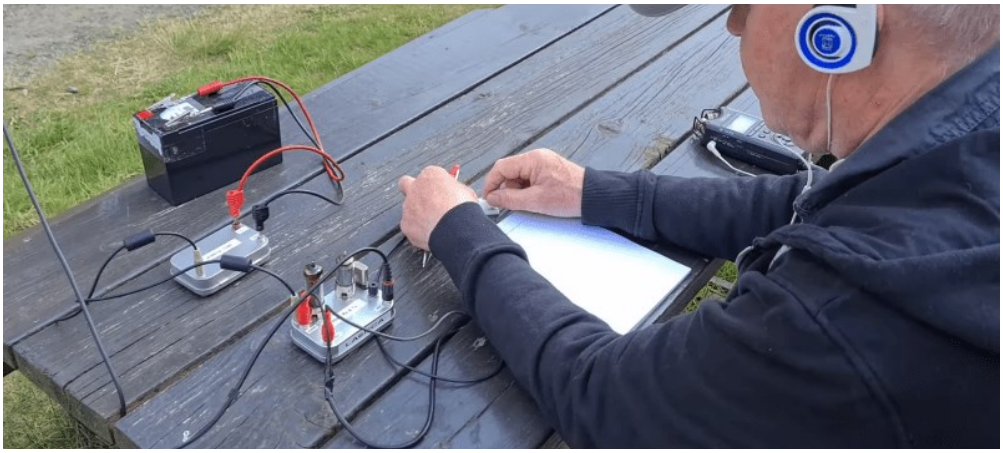
Thanks again.

~ Gerry from Portsmouth, England





Testing a variable tuning capacitor. open vanes and closed vanes.



Spy setup gets a tiny power supply

For field operations

by HACKADAY / DAN MALONEY

[Helge Fyske (LA6NCA)] may not be an actual spy — then again, he may be; if he's good at it, we wouldn't know — but he has built a couple of neat vacuum tube spy radios in the past. And there's no better test for such equipment than to haul it out into the field and try to make some contacts. But how do you power such things away from the bench?

To answer that question, skip ahead to the 3:18 mark of the video below, where [Helge] shows off his whole retro rig, including the compact 250-volt power supply he built for his two-tube 80-m Altoids tin spy transceiver. In the shack, [Helge] powers it with a bench power supply of his own design to provide the high anode voltage needed for the tubes, as well as 12 volts for their heaters. Portable operations require a more compact solution, preferably one that can be run off a battery small enough to pack in.

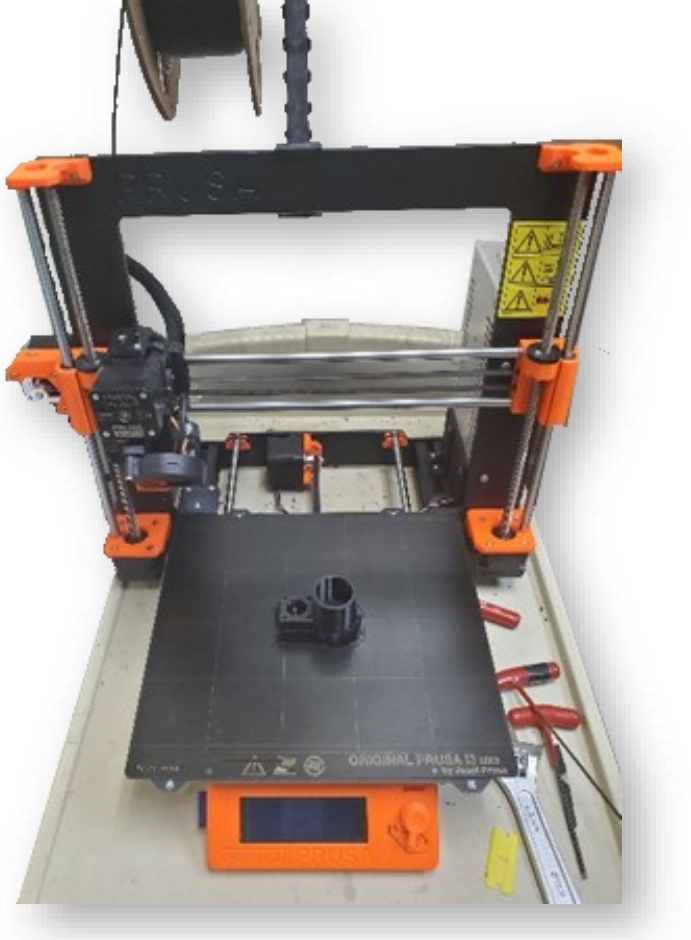
By building his power supply in a tin, [Helge] keeps to his compact build philosophy. But the circuit is all solid state, which is an interesting departure for him. The switch-mode supply uses a 4047 astable multivibrator chip as a 50-kHz oscillator, which switches back and forth between a pair of MOSFETs to drive a transformer. This steps up the 12-volt input to 280 volts AC, which is then rectified, filtered, and regulated to 250 volts DC.

To round out his spy rig, [Helge] also designed a tiny Morse key, which appears to be 3D printed and fits in its own tin, and a compact dipole antenna. Despite picking what appears to be a challenging location — the bottom of a steep-sided fjord — [Helge] was easily able to make contacts over a distance of 400 km. His noise floor was remarkably low, a testament to the solid design of his power supply. Including the sealed lead acid battery, the whole kit is compact and efficient, and it's a nice example of what vacuum tubes and solid state can accomplish together.

~ *Hackaday / Dan Maloney*
Spy Radio Setup Gets A Tiny Power Supply For Field Operations

Two tube spy transmitter in field setup and Power supply design.
The QSO is abbreviated. I am very satisfied with the result.
In this deep valley and with only 1 watt, the result is
very good
Watch on YouTube

3D printing for ham projects



If you can imagine it you can make it!

by DOUG JEFFERY VA7JDJ

Doug Jeffery VA7JDJ is a relatively new ham with an extensive technical background. Doug was profiled in the July-August 2023 Communicator.

Recently John Schouten (VE7TI) and I have been talking about using 3D printing to create things that are useful for amateur radio. Most recently we've been talking about a printed part that could be used to make an inexpensive VHF ground plane antenna. The idea comes from an article published by John Portune in the June 2019 QST magazine. Using this part as an example of the process to make a 3D printed part for yourself.

3D printing is a group of technologies called additive manufacturing. The common element for all these technologies is that they are not starting with an oversized piece of material and reducing it to the desired size and shape. Instead, materials are placed exactly where needed to create an object.

There are many different types of 3D printing equipment that allow parts to be made from a wide range of materials including plastics, metals and even concrete! We are going to look at Fusion Deposition Modelling (FDM) which is probably the most common process used in 3D printing today. FDM is typically done using a 3D printer that has a print bed that the object will be printed on, a print head called an extruder that will output the plastic and some method of moving the print head 3 dimensions above the print bed. Finally, there is a

controller that orchestrates the motion of the extruder above the print bed and how much plastic is being delivered.

In order to get a finished print, we will need to have:

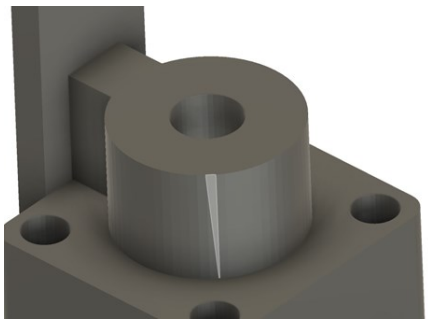
1. A 3-dimensional (3D) model of the part we wish to have printed.
2. Software to convert the 3D model to g-code through a process called slicing.
3. A 3D printer to output the final object.

Let's look at these 3 steps.

3D Model

To get started we need to have a virtual model of the object that we want to create. Typically, these files will be in the Stereolitho (SLT) file format. This file format will represent the surface of your object as a series of triangles. Large flat areas are made of 2 triangles, complex curved surfaces are made of many triangles that approximate the curve in the design. This file only contains information about the shape of the object, but not about the materials used to make it.

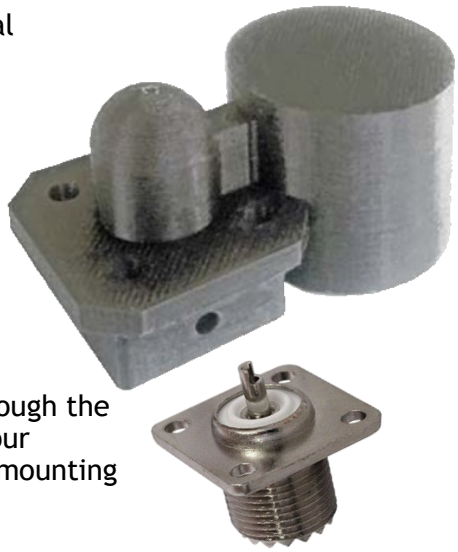
Large Triangle in STL flat surface

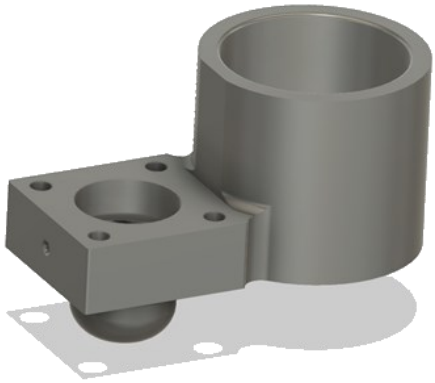


Small triangle approximating a curve in an STL file

There are many collections of SLT files available to download from websites like thingiverse.com, free3d.com, printables.com and cults3d.com to name a few. Often the fastest way to get a model to work with is to search through these sites to see if someone has already designed what you want and there is a SLT file available for you to print. If, after searching, you can't find a model, or the model is missing features that you would like, it's time to get busy creating your own 3D model. There are many great pieces of software available to create your own designs. I use Fusion360 from Autodesk. I like it because it has a free license available for non-commercial use AND it integrates fully with the Eagle schematic capture and PCB layout software. This is very useful if you are trying to incorporate a PCB into a design. Other choices include FreeCAD, TinkerCAD. SketchUP Free, and Blender. Be forewarned that these are incredibly powerful programs, but all have a learning curve. Some learning curves are steeper than others! If you have not done 3D modelling before you will need to invest some time to be able to model objects that you want to print.

In this example our goal is to print an object that looks something like this. The cylinder on the right is a cap designed to fit over a ¾" PVC pipe. The left half is designed to mount a SO239 connector underneath and to have a vertical radiator coming up through the top of the dome and four radials coming off the mounting screws for the SO-239.





I could not find an STL file for this exact design, so I decided to go into Fusion360 and put together my own version of this design. Here is the design that I settled on.

With the design completed I exported a copy of the file in the STL format and proceeded to the next step, slicing.

Slicing

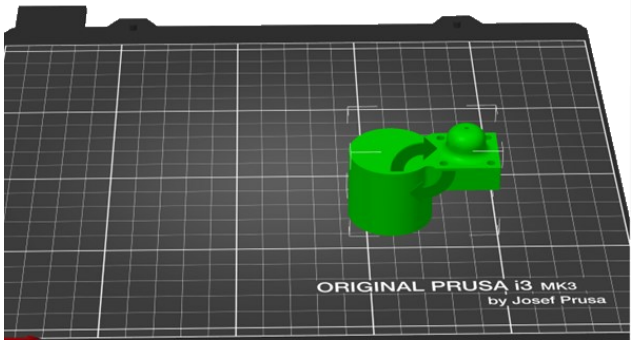
Slicing is done in a piece of software that takes in the STL file and converts the information to a specific set of instructions for the 3D printer on how to make the finished object. Information about the type of material that is going to be used, the temperature of the material when printing, the 3D printer itself, the layer height for each slice is all brought into this software. It is called a slicer because it literally creates instructions for how each layer (or slice) should be printed.

The printer I have access to is made by a Czech company called Prusa, so I use their PrusaSlicer software. Other printers use similar software that takes in the STL file and outputs instructions for the 3D printer in a format called g-code. There are several types of materials that a 3D printer can work with. In general, I use a plastic called Polyethylene terephthalate glycol (PETG). It is a reasonably durable plastic that prints well in our 3D Printer. It also is stable in UV light, something that is important if you want to make a part for outdoor use like our antenna. In the slicer software I will choose the PETG plastic. Temperature profiles to melt and flow this material are already included in the PrusaSlicer, so I just need to pick a layer height. Generally smaller layer heights will produce a more detailed print but will take much longer to complete.

Layer thickness can vary from .05 to .30 mm. For the first print of a new design, I would typically print at 0.20mm. This gives a good balance between quality and speed. If the design doesn't need any changes, I might go back and reprint at 0.1 or 0.05mm to get a nicer looking print.

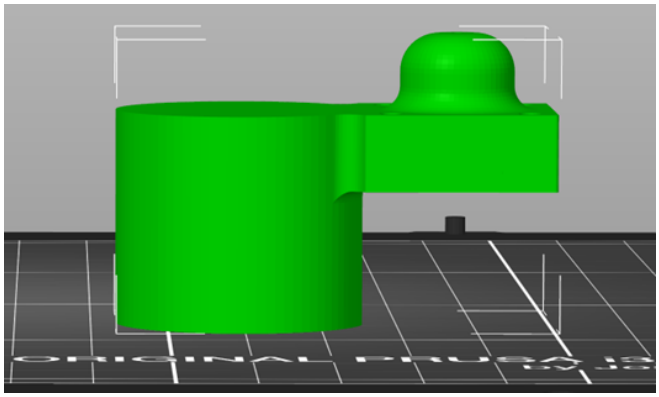
Most 3D printed objects are not 100% solid. The slicer will allow you to pick a setting called infill. This allows the printer to create a honeycomb like pattern in the center of the solid object, which saves print time and material at the expense of lower structural strength. There are MANY more settings that can be selected which vary the strength and appearance of the print. These are beyond the scope of an introductory discussion.

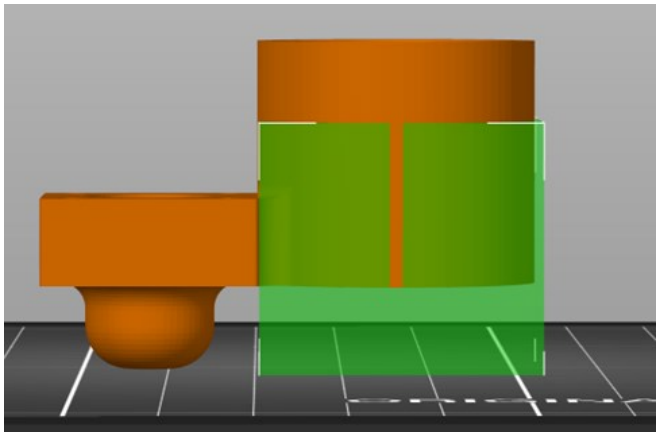
With these settings I now open the STL file in the slicer software. Our object appears in the position that it will print on the print bed. 3D prints are generally weakest in the joins between the layers. I will choose what orientation to print the part in to try to take advantage of which way the print will be strongest.



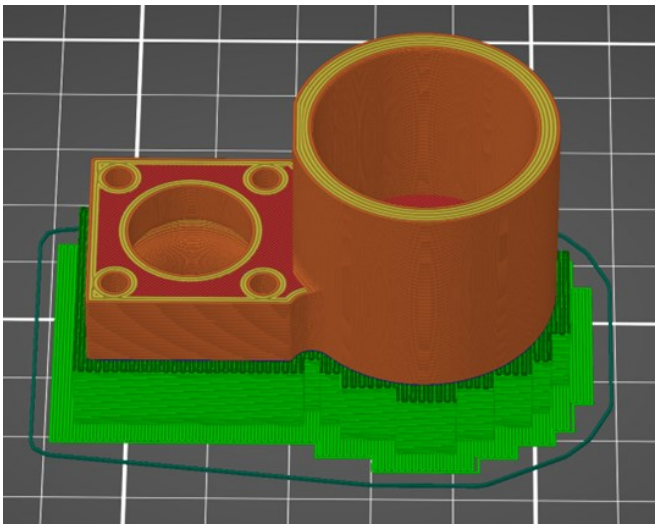
I am almost ready to start the print. One final area to consider is overhangs. The plastic material cannot be printed without something underneath. Unfortunately, our design has the area for the SO-239 as an overhang. To give the plastic in this area something to build upon I will add a temporary structure called a support. These are thin layers of plastic that allow us to print overtop of them. When the print is

complete this support can be removed leaving just the desired object.





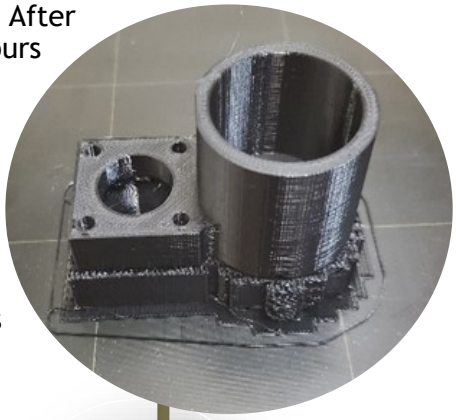
At this point we press the slice button, and the software produces a new image of the object and the support.



This image is made up from a complete simulation of the print head and the movement of the print bed that will create the part. The last part of slicing is to export the sliced model into g-code. G-code is a low-level set of instructions for the 3D printer.

Printing

This is transferred to the 3D printer over a network, or on a memory card. The printer is then warmed up and a roll of the type of plastic selected for the project is loaded into the printer. After about two and a half hours later the printer will have completed the job.



I used support in the overhang on this job, so I will need to use a razor knife to trim the plastic support off. This will yield the final product!

Conclusions

If you can imagine it you can make it. 3D printing offers an interesting way to make a variety of parts for use in Ham radio. You can design your own parts and reasonably quickly have a sample to work with. While not the perfect solution for all mechanical parts, this is a good solution for many one-of-a-kind parts for projects.

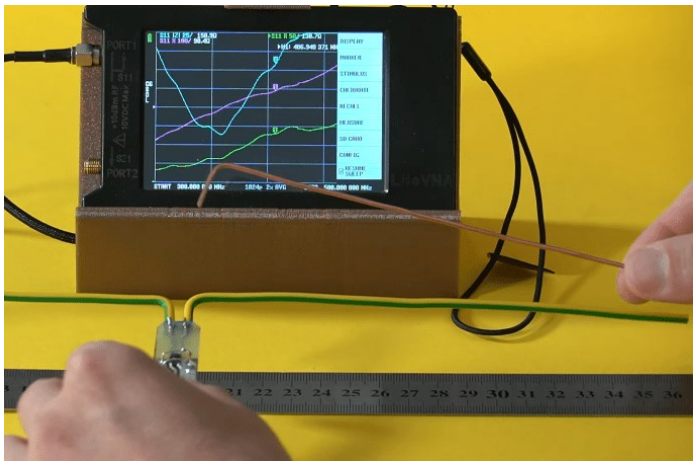
~ *Doug VA7JDJ*

The completed 1/4-wave 2m vertical using brass welding rod as elements. The 3D printed mount caps a piece of 3/4-inch conduit. The four radials are bent down at 45 degrees for a better 50-ohm match. If the radials were horizontal the antenna would have a 73-ohm impedance.

The dipole antenna

Isn't as simple as it appears

by DAN MALONEY



Dipole antennas are easy, right? Just follow the formula, cut two pieces of wire, attach your feedline, and you're on the air. But then again, maybe not. You're always advised to cut the legs a little long so you can trim to the right length, but why? Shouldn't the math just be right? And what difference does wire choice make on the antenna's characteristics? The simple dipole isn't really that simple at all.

If you've got antenna questions, check out [FesZ]'s new video on resonant dipoles, which is a deep dive into some of the mysteries of the humble dipole. In true [FesZ] fashion, he starts with simulations of various dipole configurations ranging from the ideal case — a lossless conductor in free space with as close to zero diameter conductors as the MMANA antenna simulator can support — and gradually build up to more practical designs.

We've got to admit that we were surprised by how much the wire diameter affects the resonant frequency of these theoretical antennas — the chunkier the wire, the lower the resonant frequency, which is defined as the frequency at which the antenna's impedance has only a resistive component. On the other hand, material selection plays a role, too, with copper wire being the best choice in terms of loss, followed by aluminum wire and then iron pipe, which is very lossy at small diameters. Luckily, these differences even out with increasing conductor diameter.

The most interesting part of the video for us was the experiments with practical antennas, which he builds from different materials and tests on a LiteVNA — kind of like a NanoVNA on steroids. As expected, wire thickness plays a part in antenna bandwidth — the finer the wire, the narrower the bandwidth — and the measured resonant frequency worked out to be pretty much what it was in simulation. Insulation on the wire had an unexpectedly huge effect too, pushing the resonant frequency down around 25 MHz.

Thanks to [FesZ] for this effective demonstration of designing antennas for the real world.

~ Hackaday

Original article at: https://hackaday.com/2023/08/16/the-dipole-antenna-isnt-as-simple-as-it-appears/

A Ham radio cyberdeck

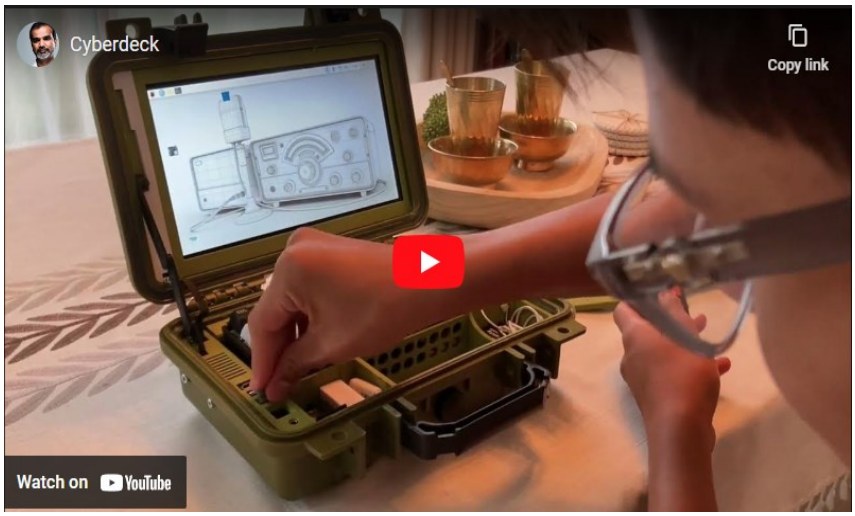
Nifty functionality

by LEWIN DAY

Cyberdecks rock because their homebrewed nature lets them feature all kinds of nifty additional functionality. [Kaushlesh] has built his deck with an eye to ham radio use, and it's a rugged and impressive thing.

The deck is built into a weatherproof enclosure, with various 3D-printed parts helping to integrate the components into the clamshell enclosure. It runs on a Raspberry Pi 4, with [Kaushlesh] springing for the hefty model with 8GB of RAM. It has a 10-inch LCD screen and a rechargable battery pack with an impressive 20 hour battery life, and is intended for use when [Kaushlesh] is out camping or participating in ham radio field days. To that end, it's equipped with a USB software-defined radio module and a BNC connector for hooking up an external antenna. It also has a game controller that mounts inside, just in case he desires playing a few games on Retropie while he's out and about. It's even got storage for a mouse and rocks a decent-sized keyboard inside.

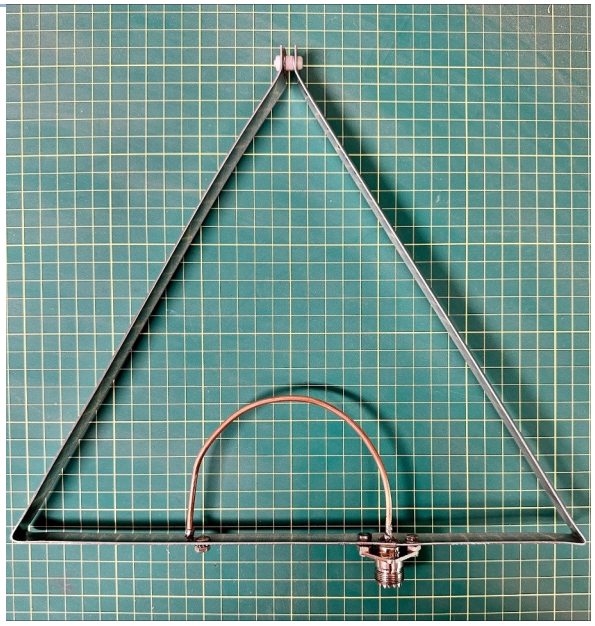
We'd love to tote this to a hamfest for a bit of hacking on the side. It's not the first ham-themed cyberdeck we've seen, either. Now we just need one built for prosciutto. Video after the break.



~ *Hackaday*

Original article at: https://hackaday.com/2023/08/15/2023-cyberdeck-challenge-a-ham-radio-cyberdeck/

Antenna Adventures



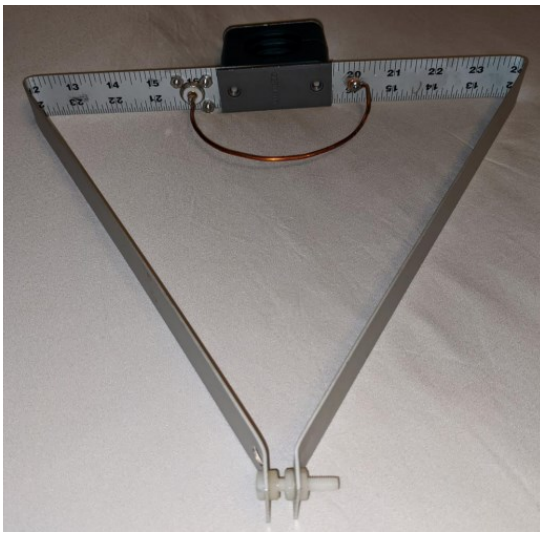
2m Triangle Antenna

Detailed construction instructions

by JOHN SCHOUTEN VE7TI

Coincidentally the antenna also showed up in the July 2023 QST, on page 20.

I think most of our regular readers know that I enjoy building antennas. The more unusual, the better. I came across a 2-meter triangle antenna that has seen several iterations. For example, there was one by K9BCT and one by W4RQ (SK), and likely more.



It is a simple antenna to build and I finished mine, start to finish, in a bit over an hour and that included scouring my shop for parts.

Randy K9BCT came up with a simple triangle loop, modified to use a simple wire feed loop. He used an aluminum yardstick (meter stick here in Canada), a component that has layout measurements readily available. Although I used 3/4" aluminum bar, because I had that at hand, you should be able to use pretty much any metal stock available.

Because W4RQ's version is easily explained, I will use his parts list and instructions. A PowerPoint slideshow is available here.

Components

1 Ace Hardware 36" aluminum Rule

1 Chassis mount SO-239 (UHF) female connector

4 #440 x ½" machine screws and nuts

1 9" long #12 AWG solid copper wire

1 #10-32 x ¾" machine screw (for the feed loop)

1 #10-32 star nut (for the feed loop)

3 #10-32 x 1" Nylon machine screw for the SO-239 connector

3 Nylon #10-32 nuts for the SO-239 connector

1 Beta, or Stauff saddle block clamp assembly for the size of the mast or tower leg the antenna will be mounted on. Available at Ace Hardware or often on e-bay. Prices vary depending on source and mast size ($3 -$12).

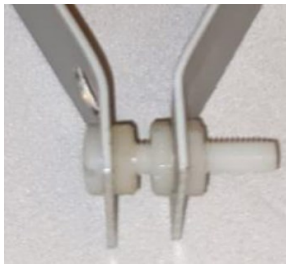
Construction

Start off with 36 inches (") of material. If it's a meter stick you will have about 3" left over. Bend over the first ½" and last ½" of a 36" rule, 60 degrees in the same direction. This will become the tuning point.

The rule is then bent 120 degrees in the opposite direction at the 12" mark and again at the 24" mark to form the triangle, with the two ½" ends parallel. The top in the previous page photo is the12" leg and the two sides are actually 11½" plus the ½" ends.

A suggestion is to clamp a round screwdriver shaft in the vise with the rule so the bends are not made too sharp.

Be careful because aluminum can snap if too much force is applied too quickly.



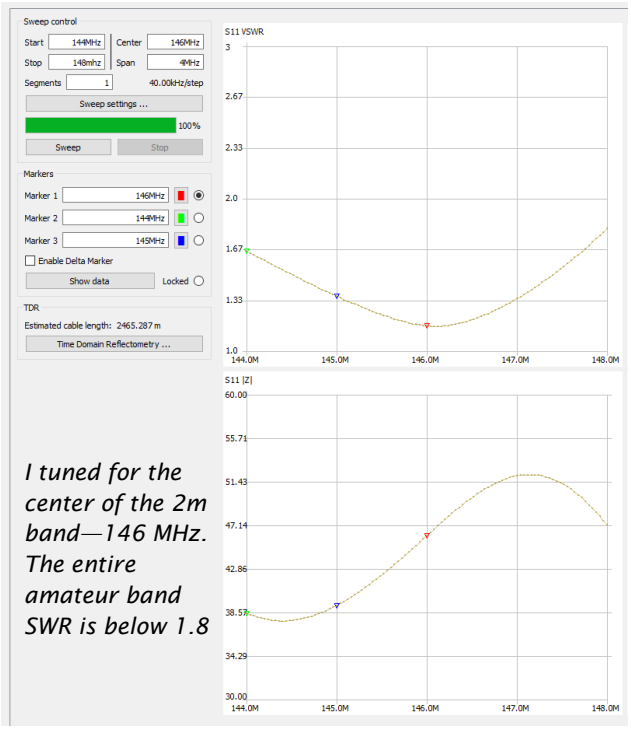
Drill a thru-hole in the center of the ½" parallel ends. Install the #10-32 nylon screw and three nylon nuts. The nylon screw and three nuts will be used to adjust the resonant frequency of the antenna *[right]*.

If using a rule, drill a hole at the 16" mark (4" from one end of the top leg. This is for the #10-32 machine screw that will secure the end of the feed loop wire.

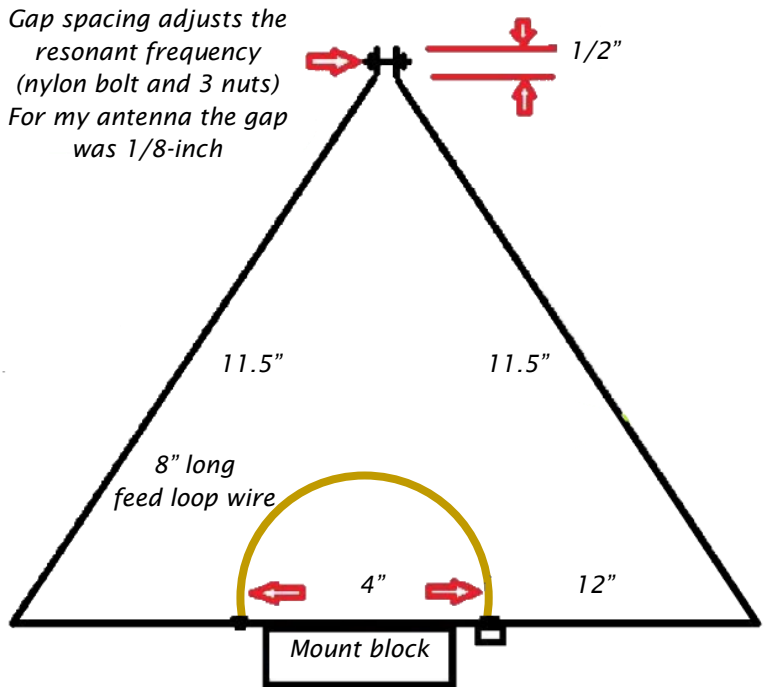
Drill and mount the UHF connector at the 20" mark. Scrape the surface of the rule to make good contact and use antioxidant compound (i.e. Noalox). If not using a rule, refer to the diagram below for measurements. You are basically dividing the top leg into three 4" sections.

Solder one end of the 9" wire to the center pin of the UHF connector, then form an 8" loop, using the extra 1" of wire to form an "eye" used to secure it to the rule with the #10-32 machine screw and star nut at the 16" mark, using Noalox

2-meter Triangle loop



I tuned for the center of the 2m band—146 MHz. The entire amateur band SWR is below 1.8



after scraping the aluminum when securing the "eye" to the rule.

Match the position and drill the rule for the mast Saddle Clamp assembly.

Set the resonant frequency with an antenna analyzer. This antenna is very forgiving, adjustable from below 139 MHz to above 148 MHz by adjusting the gap with the nylon screw. For my version, the gap was 1/8-inch and the adjustment was very fine. As the gap gets wider the resonant frequency goes higher and vice versa. I also found that a slightly longer feed loop increased the antenna bandwidth at the expense of slightly higher overall SWR.

Other than the nylon hardware (Amazon), my parts cost was negligible because I had the necessary components at hand. Buying the parts, including the rule should be around C$20.

Results

Band Width: 2.16 MHz @ 2.15 VSWR points.

Resonance: 144.200 MHz, Return Loss: 36 dB

VSWR at resonance: 1.03:1 with a fairly narrow bandwidth but sufficient to cover the 2m band.

Impedance: 49.4 Ohms. R: 49.4 Ohms. X: -1.43 Ohms

Estimated gain: +4 dBi

Of course, the true test is on-air. I tried this antenna on our local repeater and several others that are typically more difficult to reach. I found negligible difference mounting it vertically or horizontally and I got excellent results on all the repeaters I tried, certainly much better than any ¼ -wave vertical that I have used.

~ John VE7TI
With content from W4RQ (SK) and Randy K9BCT

...more

Antenna Adventures

A multi-band single wire antenna

Perfect for SOTA/POTA activations

by JOHN SCHOUTEN VE7TI

John Schouten VE7TI is active on HF, 2m and 70cm.

I appreciate inexpensive but effective antenna design. Sure, you can spend hundreds of dollars to buy a multiband antenna for POTA or GOTA but they are so simple to build, why would you want to? You can enhance your skills and communication capabilities by constructing custom antennas.

One popular and versatile option is the multi-band HF dipole antenna. This antenna design allows for effective communication across multiple HF bands by connecting or disconnecting sections along its length making it an inexpensive asset for ham radio operators, particularly outdoors enthusiasts and those needing a light, packable antenna that can be erected almost anywhere, and with good results—better than an end-fed.

I came across such an antenna recently at our Saturday morning meeting. Dino VE7NX brought a multi-band wire HF antenna that I figured I could make in an hour. I asked how it performed, and Dino assured me that my time would be worth the effort, and told me that he used it in Aruba and made many contacts. With that in mind, let's delve into the step-by-step process of constructing a multi-band single-wire HF dipole antenna using bullet connectors to connect wire lengths, offering a flexible and efficient solution.

A Review: The Basics of Dipole Antennas

A dipole antenna is a simple yet effective option that consists of two conductive elements, usually wires,

oriented in a straight line and fed at the center. The length of each element is typically a half-wavelength at the desired operating frequency. The fundamental operating principle behind a dipole antenna lies in its ability to effectively generate and radiate electromagnetic waves when a high frequency alternating current flows through it.

At the core of dipole antenna theory is the concept of resonance. When a dipole antenna's length is a half-wavelength (λ/2) at the operating frequency, it becomes resonant. This means that the antenna's length is precisely matched to the wavelength of the radio wave it is intended to transmit or receive. This alignment results in increased efficiency, as the antenna can efficiently couple with the electromagnetic field, allowing for more effective radiation and reception.

Radiation Pattern and Polarization

The radiation pattern of an antenna illustrates the direction and strength of the radiated electromagnetic field. For a dipole antenna, the radiation pattern resembles a doughnut, with the most intense radiation perpendicular to the antenna's axis. This pattern is known as an omnidirectional pattern, as the signal is evenly distributed.

The polarization of an antenna refers to the orientation of the electric field in the radiated wave. A dipole antenna typically radiates linearly polarized waves, which means that the electric field oscillates in a straight line. Normally, it's important to consider the polarization of both the transmitting and receiving antennas for optimal signal reception, however for HF, atmospherics will result in changes of polarization, so orientation is less important than with FM. Whether hung horizontally or vertically, this antenna will do the job on HF.

Feed Point and Impedance

The feed point is the location where the transmitter or receiver is connected to the antenna. In a dipole antenna, the feed point is at the center where the two conductive elements meet.

The impedance at the feed point plays a crucial role in matching the antenna to the transmission line (usually coaxial cable) and minimizing signal reflections. A well-designed dipole antenna should have an impedance close to the characteristic impedance of the transmission line to avoid signal loss and achieve efficient power transfer.

Multi-Band Dipole Antennas

One of the key advantages of dipole antennas is their ability to work on multiple frequencies or bands with proper design. This is achieved by using a multi-band dipole, where each side is exactly a half-wavelength for the lowest band. To make it multi-band, the antenna is designed to be resonant at multiple frequencies by coupling individual wire lengths together using clips or connectors, allowing for versatile communication across different portions of the HF radio frequency spectrum.

Understanding the Multi-Band HF Dipole Antenna

This multi-band HF dipole antenna is designed for five bands—14 MHz to 30 MHz. It consists of five wires each side, arranged in a straight line and connected at the center. Each element is a half-wavelength long for the desired frequency, ensuring resonance and optimal signal transmission. They are linked by ‘bullet’ connectors commonly found at electrical and automotive suppliers.

Materials You Will Need

Before you start construction, gather the necessary materials:

Wire: High-quality insulated wire, such as #14 copper house wire, is ideal for this project. The wire's diameter should be appropriate for the power you intend to use. For QRP modes I suggest using #18 or 20 Teflon coated wire. It is light, avoids knotting or kinking, and winds easily on a cord reel. Just don’t tighten any soft copper wire too much. If you stretch it, your antenna will detune.

Bullet connectors: Bullet connectors are cylindrical connectors with a male and female end that can easily be joined and disconnected. These connectors will facilitate the connection of wire lengths.

Insulators: Insulators are used to electrically isolate the antenna wire sections and at the ends of the antenna. Use 1.5 to 2" lengths of 3/8" wooden dowelling or another non-conductive material such the plastic 'dog bone' shown.

A center support: Shown in the photos is a piece of circuit board, but you can use another non-conductive material, more dowelling or a PVC plumbing 'T' connector.

Using a PVC Cap will permit you to raise the center of the antenna to a suitable height above ground either by pulling it up by a string

around at tree branch or fastened to a length if PVC pipe.

Coaxial Cable: 50-Ohm coaxial cable will connect the antenna to your radio equipment.

Step-by-Step Construction

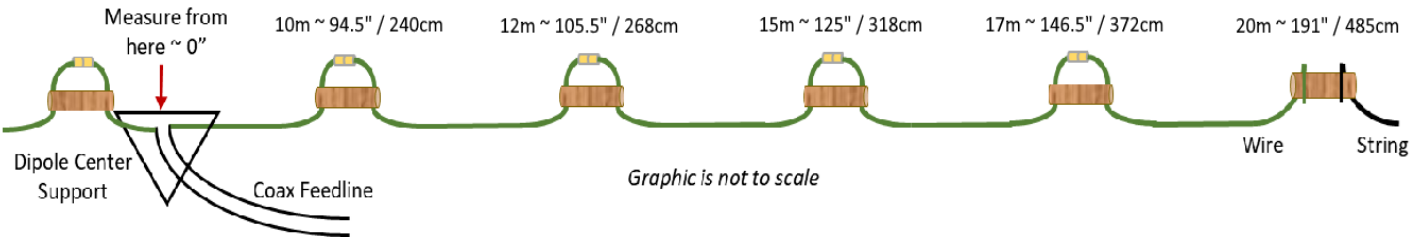
Calculate the wire lengths: Determine the lengths of wire needed for each band you intend to operate on. You can use online calculators or formulas based on the desired frequency but we'll save you the trouble [*see the diagram next page]*.

Cut the Wires: Cut the wire lengths with extra for the loops and connectors according to the diagram, spacing of the insulators. Measurements are to the center of each insulator starting from the center support. Its OK to make them a bit longer. Remember that each wire should be a half-wavelength long for the respective frequency.

Attach Insulators: Secure insulators to the other end of the wires. These insulators will prevent the wires from touching and ensure proper antenna functionality.

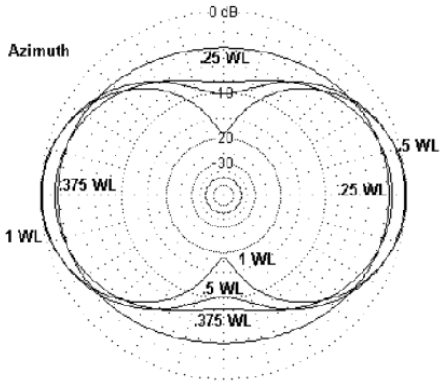
Raise it: Use one of many devices to get that wire as high as possible. One method that works well is to use a golf ball with an eye screw. Fasten your string, spin it and let go at the proper time to launch it. A bit of practice will make you an expert. Of course, if you're a golfer, your sand wedge may become part of your ham field kit. In use, keep the antenna wires taut and separated. Ensure that the antenna is clear of power lines and other obstructions for safety and optimal signal transmission. You can suspend the dipole horizontally or as a 'sloper' angled with one end high and one low. Best results are achieved by getting it as high off the ground as possible.

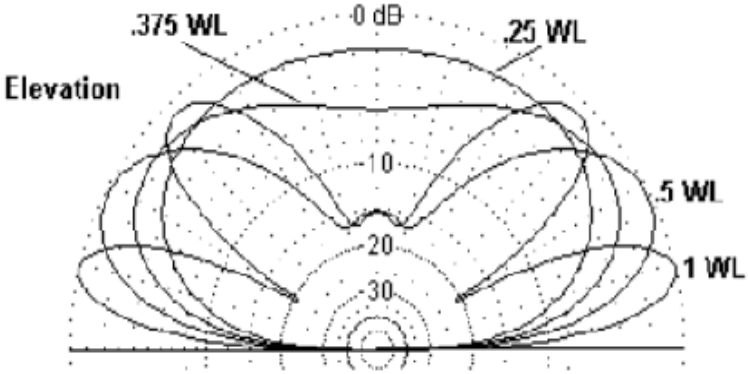
Test and tune: Start with the shortest section (10m) and tune it. Connect the next bullet connector and tune the 10m section. Attach bullet connectors to the ends of each wire. I prefer to crimp and solder to avoid them pulling free under strain. These connectors provide a reliable and easily adjustable connection point.



Above: Measurements are from left to right at the center of each insulator/bullet so leave some extra wire for loops and connectors. Of course, both legs of the dipole should be exactly the same but for space only the left one is shown.

Below: Azimuth and elevation plots of a typical 1/2-wavelength resonant dipole antenna at heights of 1/4-wavelength, 3/8-wavelength, 1/2-wavelength, and 1-wavelength above ground. The radiation pattern improves with height above ground.





Continue adding sections and tuning until you have good SWR on 20m, the longest combined wire length. Use a NanoVNA, antenna analyzer or SWR meter to fine-tune the antenna's length for each band, aiming for the lowest SWR values.

Once the antenna is set up, connect it to your radio and conduct tests on different bands, disconnecting one set of bullet connectors at a time.

Surprisingly, no balun was required at the feed point, and no tuner either. If configured as an 'Inverted V', the angle between the legs should be more than 120 degrees apart for best performance. The angle will change the impedance of the antenna and affect SWR.

Final comments

I was amazed at how well this antenna worked, even horizontally at only fifteen feet off the ground. I made several contacts in North America and I heard one Japanese station, but could not work it at my low power setting. This antenna will take 100 Watts.

Constructing a multi-band HF dipole antenna using bullet connectors to connect wire lengths is a rewarding project that saves you money compared to a commercially manufactured one. Remember that patience and careful attention to detail during construction and tuning will ultimately result in an antenna that delivers optimal performance and effective communication.

~ John VE7TI (with inspiration from Dino VE7NX)

from

Daniel's Workbench

Daniel Romila VE7LCG

Repeaters with one transistor

by DANIEL ROMILA VE7LCG

Daniel Romila VE7LCG is constantly experimenting with electronics

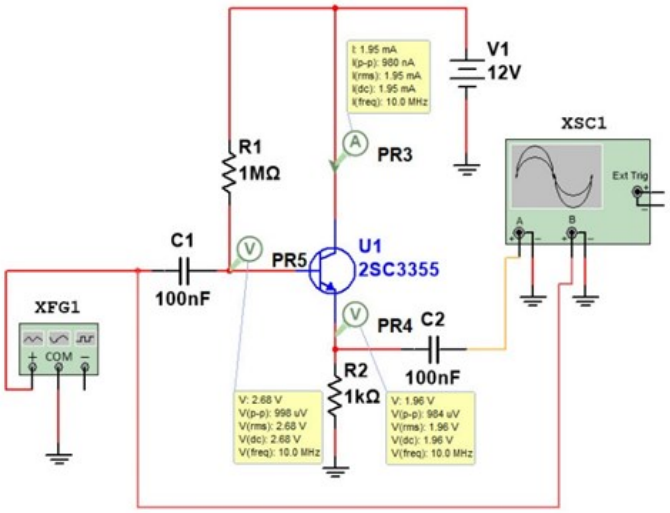
The title is intentionally written to create confusion. This article is not about UHF/VHF repeaters. What I am describing in this article is more often known as “followers”, and likely those who studied electronics engineering would know the technical English word “repeater” is also used for the same thing.

ChatGPT tells us:

“An emitter repeater, also known as an emitter follower, is a type of transistor amplifier circuit that uses a transistor in a common-emitter configuration. In this circuit, the input signal is applied to the base of the transistor, while the output is taken from the emitter.”

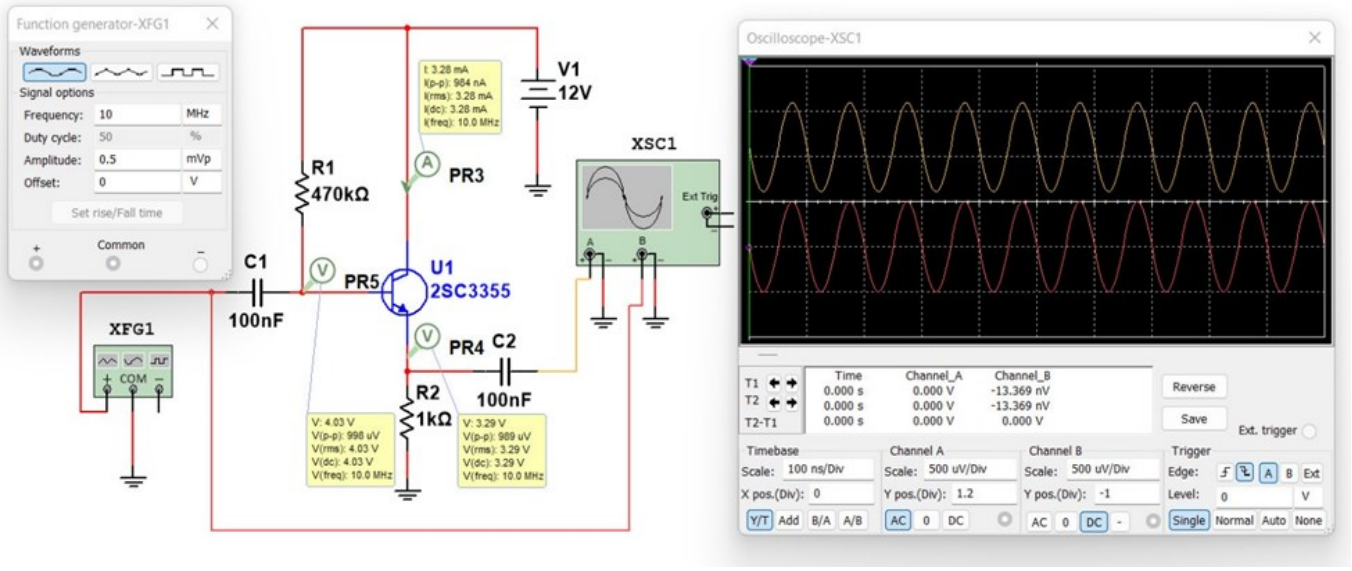
For those also speaking a Latin language there is no confusion, because in this group of languages the translated word “repeater” is used, not the translation of “follower”.

Even in the modern electronics schematics one can still find a classic analog block, the repeater. The purpose of the repeater is to separate the electronics from in front of it from the electronics found after it.



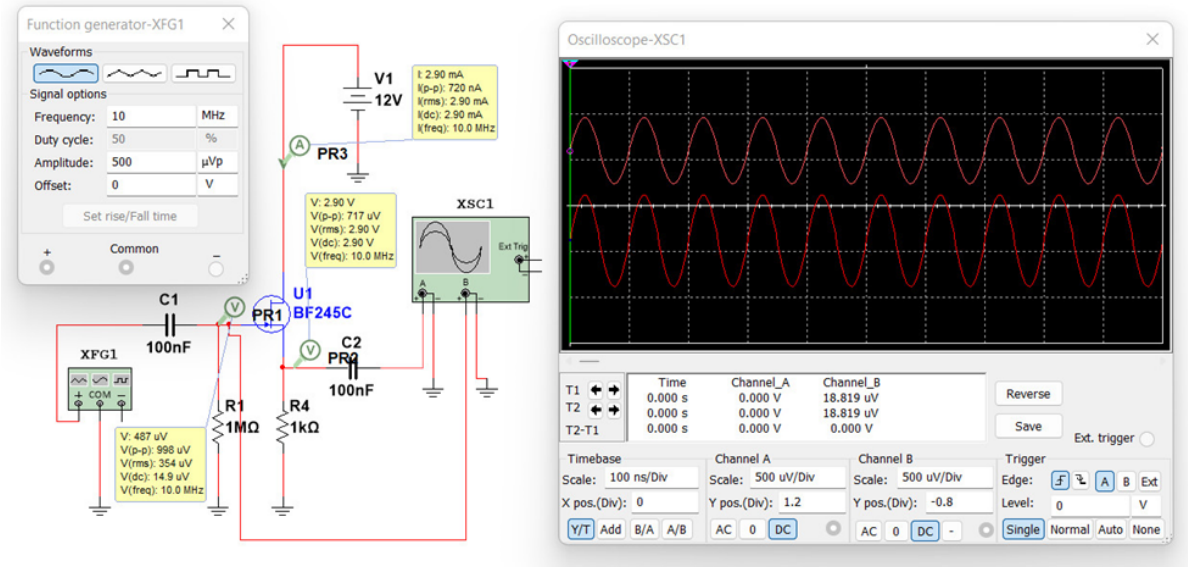
A typical example is to separate an oscillator from the amplifier stages. The stability of the oscillator (frequency and output level) depends on constantly seeing the same thing at its output. There are many kinds of repeaters used in radio/electronics, like for example the 1:1 transformer separating AC from DC, but the subject of this short article is just the repeater made with one transistor.

In most cases the repeater should have a high input impedance and a low output impedance. The first and cheapest active semiconductor to try is the BJT (bipolar junction transistor) shown here.



For a 998 uV input signal we have a 989 uV output signal (peak to peak measurements), 99% efficiency. The input impedance is primarily dictated by R1 (we can modify only R1, not the input impedance of the transistor itself). Trying to push R1 towards higher values reduces the output voltage, so it reduces the efficiency of the repeater.

A FET (field effect transistor) has a higher impedance itself, which allows biasing with higher values resistors. The result is a higher impedance repeater.

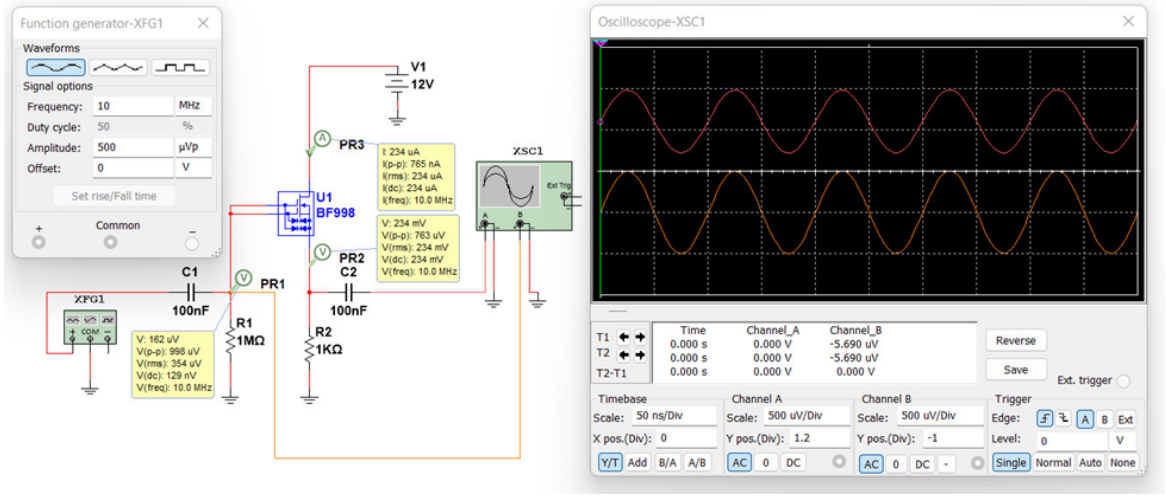


The efficiency of a JFET separator is lower than that of a BJT. In my example, with a BF245C transistor, at 10 MHz, we obtain 71.84% efficiency for the peak-to-peak output/input levels. The output level does not modify when changing R1 from 470 KOhm to 1 MOhm. My practical experiments confirm the results obtained in a computer simulation. The loss of signal is important especially when we use the repeater/separator in first receiver's blocks.

The next version tried uses a MOSFET (metal–oxide–semiconductor field-effect transistor) BF998:

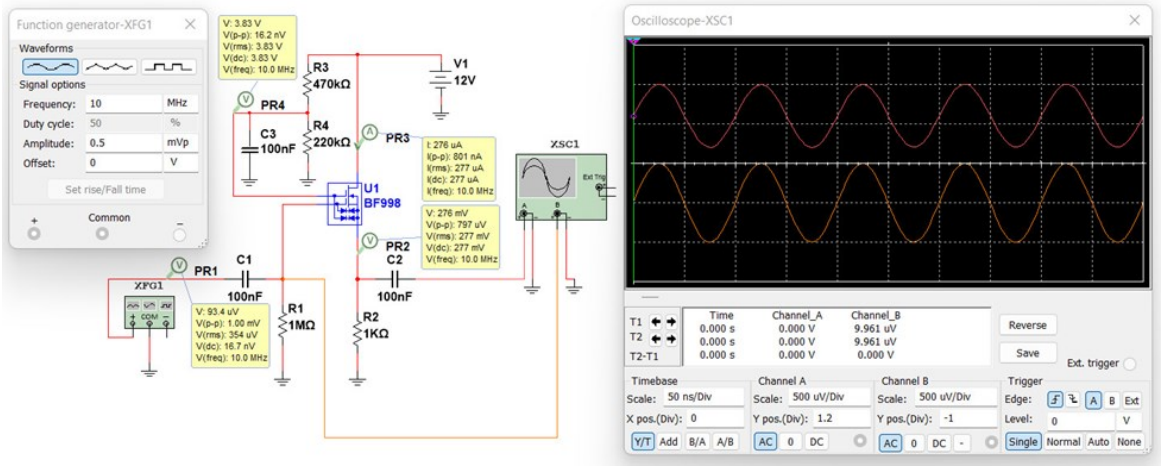
We obtain 763uV peak to peak output for an input of 998uVpp. It starts to look better, as efficiency (76.45%) and as input impedance, at the same time.

Note: BF998 is close to 12 V between drain and source, its maximum value, in the schematic.



If we look in the above schematic G1 and G2 were connected together. The datasheet recommends biasing G2 at about 2-4 Volts, depending on the MOSFET used.

The proper biasing moved the efficiency of the repeater from 76.45% to 79.70 %. Depending on the practical situation, the increase of efficiency might be worth adding 2 resistors and 1 capacitor. This addition of supplementary components also complicates the layout of the PCB.



My practical experimentation confirms all the above. A long time ago, when I started my experience in electronics, I was very disappointed of the loss of the JFET transistor, and I blamed the loss on the transistors I had, from the BF245 family (A-B-C versions). Actually, BF245 is a high gain FET, and other models of FET have even worse efficiency as repeaters. Replacing BF245C with 2N4222A downgrades the efficiency from 71.84% to 65.53%.

~ Daniel VE7LCG

...more from

DIY (do it yourself) power banks

by DANIEL ROMILA VE7LCG

You may have a usable source of power from your old rechargeable batteries. **Daniel Romila VE7LCG** explains why the 'cheap' solution is not the answer.

My 2011 laptop died in 2023. It had a second-generation I7 processor, 16 Giga Bytes DDR3 memory, and a GT460M video card capable of handling two monitors in full high definition. It was great until it died: I had no problems writing articles on it, browsing the Internet, even processing video and audio, in addition to the computer assisted design I had to do for electronics. The intel i7 2630QM is more powerful than many processors in current laptops. It did consume a lot, and the video heated when used with two monitors. It helped that in the last 10 years laptop designers concentrated on lowering power consumption and not on increasing processing power (not so much, but they did it also). Even the newest Windows 11 operating system can be installed on these old computers, with some bypassing of Microsoft checks.

So, I remained with a dead body. I salvaged the battery (it was always plugged-in, never used outside the home), the blue-ray unit, the hard drives (SSD) and I threw away everything else. I did not feel like trying to place components from a bad laptop into a good laptop to risk damaging that device with components more than 10 years old. The battery looks like this:

It was not useful for my projects as it was. I had to disassemble it, with the hope that inside there would be classic 18650 Lithium-Polymer cylindrical rechargeable batteries. My disassembly was rewarded with 8 Samsung 18650-26F rechargeable batteries. Those are 3.7 Volt (nominal) and 2.6 Amp capacity batteries. After weeks of laying in a drawer, they still had voltages between 4.20V and 4.22V. Not bad.

At the end of June 2023, if you were to buy this Samsung battery you'd have to pay $7.50 CAD (= 5.70 USD =5.23 EURO = 106.61 ZAR), shipping and taxes included.

They are this expensive because brand name batteries really live up to their rated capacity, while the no name ones are fake, and marketed as having unrealistic capacities. I estimated my gain there as $50 CAD (=38 USD =35 EURO =711 ZAR) – that means money that I save instead of buying now, not the resale value. I am better OFF with 8 Samsung 18650 batteries, a blue-ray DVD unit and two SSDs than with an old laptop (LOL).

I decided to put all eight 18650 batteries in one power bank. Luckily, the Chinese websites have plenty of models on which one just opens the lid, puts the 18650 batteries inside and you now have a capable power bank. I bought it for $5.62 CAD (=4.27 USD =3.92 EURO =80 ZAR) (shipping and taxes included) something that does not have fancy features like wireless charging, but only useful features for supplying power to my amateur radio projects.

I bought both a black and a white case *[below]*. The display's protection film must be pulled from its paper and applied on the outside lid.

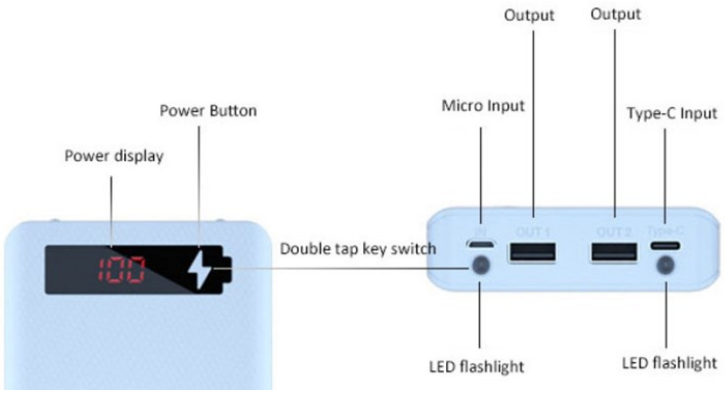
On the website the power banks are shown as having red LEDs. I received, white LEDs on both of them. I like them better with white LEDs.

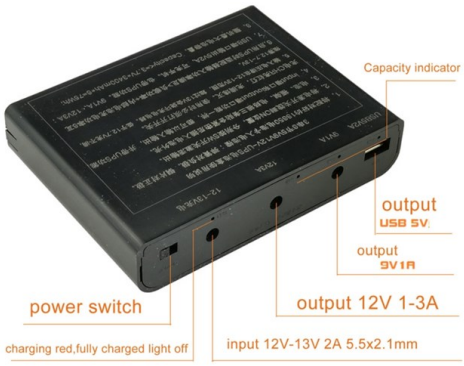
You can even install only one 18650 battery, because all of them are in parallel. It was a big temptation to buy a case for 20 batteries, but I would have paid almost 3 times more for a big thick case.

There are power banks with only one element, as I've also sometimes seen at Dollar Tree stores.

For many readers, cases with 3-4 elements maybe more suitable, as some have cables for supplying power to devices from the power bank, at some $5 CAD (=3.8 USD =3.5 EURO =71 ZAR) (shipping and taxes included).

One idea that crossed my mind was to make a solar power bank, but I live in Vancouver (Canada), and there is little sun around here.





Many of my projects need more than 5 Volts, and a 9 V or 12 V power bank would be more useful. There are such power banks, but their prices are above $18 CAD (=14 USD =13 EURO =256 ZAR) (shipping and taxes included), and they have no display to see how much power remains.

I prefer to use a separate 5 Volt power bank and a desktop power supply XY-UDP connected to a USB port on the power bank.

The XY-UDP is a digital device, it can adjust the output voltage between 0.6V and 30V, it has adjustable current protection, and it even displays temperature.

When deciding to make a power bank with salvaged 18650 rechargeable batteries and DIY cases from online vendors, you must pay attention 18650 battery polarity as they are flat at both ends. All those DIY power banks do not have room enough for pointed batteries, like the blue ones from the right picture.

~ Daniel VE7LCG

…more from

Tips and tricks about measurements (or false measurements) with NanoVNA

- when tethered on PC with NanoVNA Saver

by DANIEL ROMILA VE7LCG

Daniel Romila VE7LCG provides you with an evaluation of the NanoVNA and the available software.

I am writing this article in August 2023 about NanoVNA Saver 0.5.5, the latest version, that I installed today on a Windows 11 PC to which I tethered a NanoVNA v2 (SAA2).

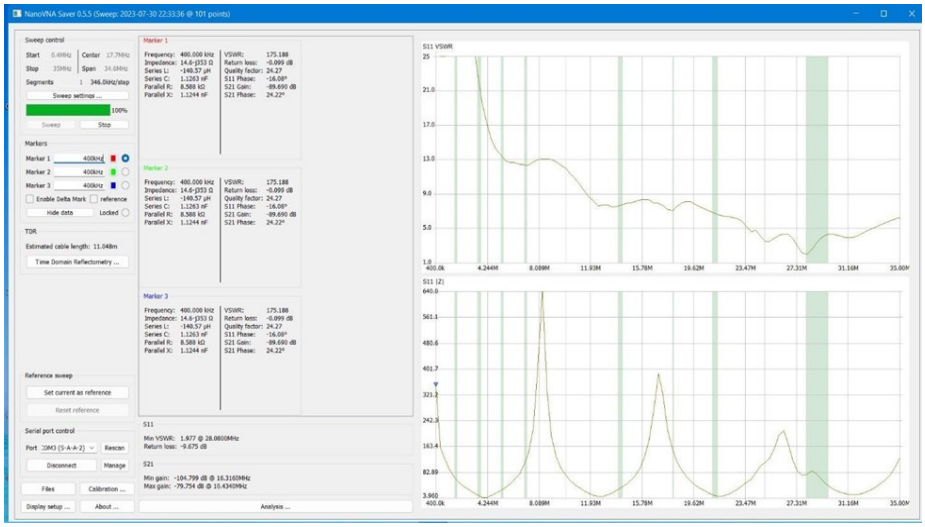
I want to start by underlining that a good antenna is an antenna that works in actual amateur radio traffic. Such an antenna might provide good, or not so good measurements. In my experience, I made antennas that look perfect on measurements with a NanoVNA but gave poor practical results. So:

- Always start by finding a radio sweet spot where to install the antenna. This is more important than the SWR. If you have a wall of several tall buildings between an antenna's position and the repeater you want to activate, a SWR of 1.1 would not help you in any way. Try with your antenna – as is, recently built and not yet finetuned – to move it to several positions and hear how it works. In UHF/VHF there are long net meetings which allow for finding a good radio sweet spot. Even half meter left or right can dramatically change the radio conditions.
- Pre-tune the antenna in place, with a portable NanoVNA, attached directly to the antenna or with a short cable, a different one than your intended feed line. This would avoid making measurements and tuning a system which in fact is your feed line and a connected part of your antenna. Dipole antennas are directional, loop antennas are directional. If you measure an antenna in its final position, with

a nice feed line, and you obtain good values for your measurements, but if your antenna (the above-mentioned types) is not directional, your antenna wil not work. Short dipoles, coil loaded dipoles, delta loops, triangle bent dipoles, all of them must be directional. No change in reception/transmission when you rotate your (above-mentioned type) antenna 90 degrees means that your antenna does not work.

- Calibrate the NanoVNA (v2 in my case). Do a separate calibration, for each frequency range you want to work with, on the NanoVNA Saver software, or VNA QT, if you abandoned the Saver program, which you should if you use its Windows version. I noticed that calibrations need to be periodically re-done.

On the screen of the NanoVNA verify that you obtain exactly what you saw on the computer screen, in the NanoVNA Saver program. In both cases the measurement tool is the NanoVNA hardware, so your both screens must look the same. Or similarly, to reveal some info from the end of the article, at least the shape has to be the same, if the values are not.



Whenever I obtain different results, and/or something that looks very strange, the first thing I suspect is the calibration process. It is easy to confuse the calibration caps during various phases of the calibration, and this totally messes up all future measurements based on that calibration.

I always start by analyzing the antenna in a wider frequency interval than the antenna is meant to work in. For example, I want to tune a ¼-wave vertical stick for the 10 meter band. I first analyze what is happening in the 0.4 MHz – 35 MHz range *[screengrab below]*.

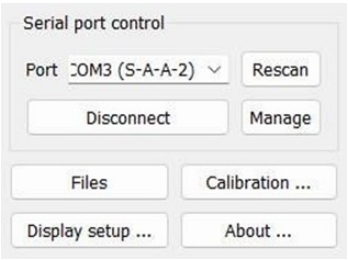
This wider range analysis allowed me to immediately see the antenna is tuned just a bit on the left of the 10-meter band, on a lower frequency. If I analyzed only the interval 28 MHz – 29.7 MHz, I would have seen the lower the frequency, the better results, but I could not have seen how far from the useful interval the tuning frequency is. I see that I am not far away, so just a little playing with the length of the antenna would give me better results.

I use only 101 points for the whole interval, although the computer program can increase the number of points. Increasing the number of points would also increase the time for sweeping from Fmin to Fmax. I am happy with a rough indication.

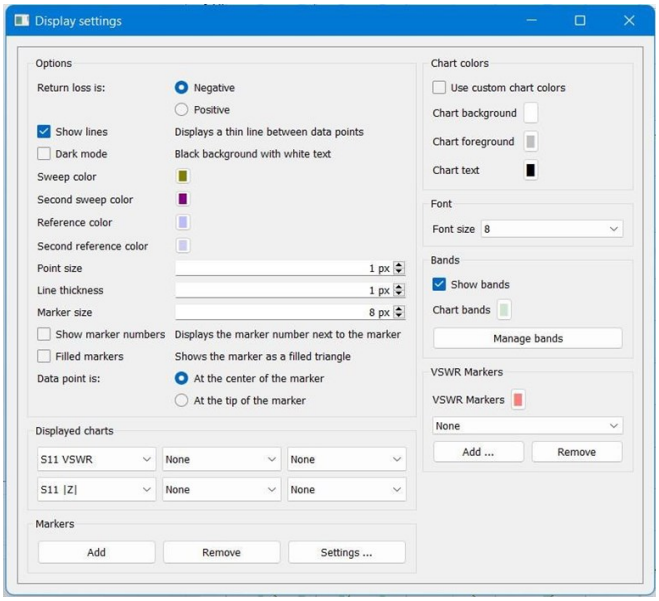
The upper graph is SWR. The lower graph is Z, S11, the impedance. It is possible to show the inductive and the capacitive components of the impedance, and this eventually tells me if I have to make the

antenna longer or shorter. Since the real results depend on so many factors in the immediate vicinity of the antenna, I prefer to use telescopic antennas, do the adjustments, and after the fix eventually change to metal rods of the same length. Actually, I am so much a fan of telescopic antennas, but they are so cheap, that I prefer to leave the telescopic antennas in place. They also have a larger diameter than the rods I could use.

Using a wide range of frequency requires calibration done for that range. It is a rough estimate, but improving the antenna is a step-by-step process, and this step – with a wider range of frequencies – is just one of the initial steps.

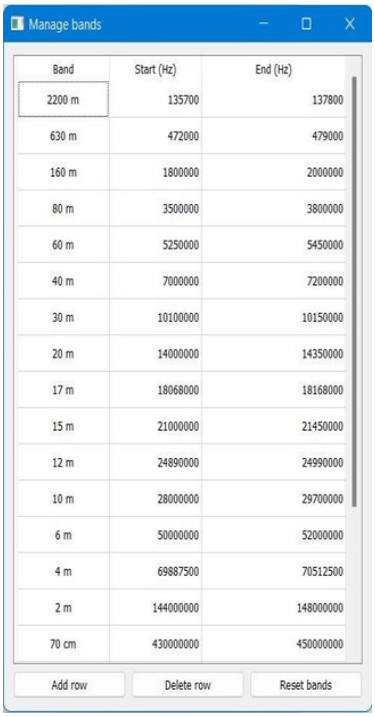


One can see in the previous screenshot that the amateur radio bands are clearly displayed in green. I did this by changing the default options of the NanoVNA Saver program. At the left lower corner there is a button called “Display setup”. Clicking this button brings another window with more options.



On the upper left corner I unselected the dark mode. I do not like the dark mode, because I cannot put enough information on the screen if everything is dark, and I cannot see the graph well. My preference. On the right side I decided to “Show bands” and I selected the green color.

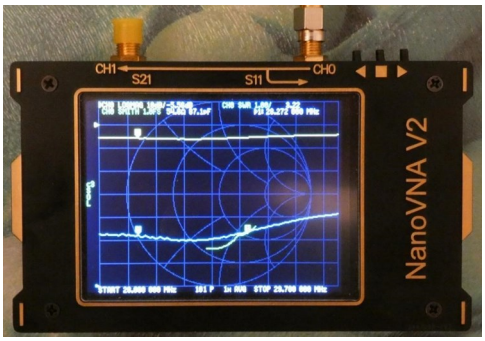
Unfortunately for me, the computer program was made for another Amateur Radio region, so the default bands do not match the bands I have in Canada. I had to click on the right “Manage bands”, and I modified the frequencies of already predefined bands, and added other bands.



As mentioned before, at a certain moment I do have to make adjustments in a limited range of frequencies, the intended band. For example, the vertical stick for 10 meter looks like having the following SWR graph on the computer.

It does not look great, which I already knew, from the wider frequency range analysis. It was a citizen band antenna, so it is too long and tuned somewhere under 28 MHz.

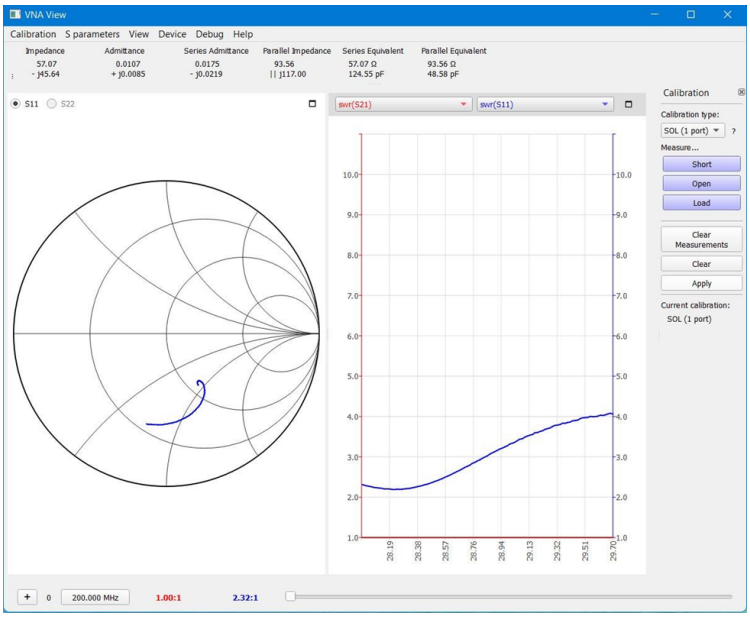
Before going deeper into improving the antenna I disconnect the NanoVNA from the computer, and I verify that the screen of the hardware instrument itself shows me the same thing that I saw on the computer.



Obviously, what I see (as values) on the NanoVNA v2 itself is not as nice as on the computer program NanoVNA Saver 0.5.5. I repeated the calibration on the instrument itself, but I obtained the same higher SWR all over.

I already had suspicions about results being too good to be true as obtained with the NanoVNA Saver 0.5.5 program on previous occasions. It constantly showed about 0.5 better SWR than the NanoVNA v2 instrument itself. Sometimes it showed worse results, but usually everything is nicer in the Saver 0.5.5 program than on the instrument.

I wanted to verify these readings with another computer program, VNA View (VNA QT) version 1.1. I did the calibration for the 10-meter band, to get the same graph as the previous two, for comparison. VNA View 1.1 shows me the same results as the NanoVNA v2 instrument itself *[screenshot below]*.



It looks to me like the NanoVNA Saver computer program isn't great. It has a lot of options to show the data, but the data is wrong. It can show better or worse values than the instrument. If everything is constantly bumped up or constantly bumped down, I can still use the better graphic capabilities of NanoVNA Saver for adjusting and improving the antenna.

I found that there were others who experienced the same problem, I searched the Internet, and found a group messaging "NanoVNA Saver showing SWR radically different than the device" at: https://groups.io/g/nanovnausers/topic/78361346

Richard (N1RBD) writes: "I went out to a park today to tune my EFHW and it seems that the latest NanoVNA saver shows a SWR that is significantly different than the device shows. I almost wound up cutting the wire too short, but I thought something was off and went to check the graph on the LCD. It was around 1.7 where the Saver software was showing 2.4+. Has anyone else seen this issue?"

Users suggested repeating the calibration, using a grounded USB cable, and similar things. But no, NanoVNA Saver is just buggy.

After reading the comments from the group, a user called AllasoPraise wrote: "Interesting, I've been making all my measurements using QT on my laptop, then panicked a bit when I read this, as I have made many tedious antenna tweaks based on that data. But I just checked using only the NanoVNA with USB disconnected, and the SWR curves look just about identical. I even connected up my USB cable and observed no difference in the sweep on the NanoVNA screen."

So, he just confirmed the problem does not appear on the VNA QT (VNA Viewer), which I also noticed. For now, I will have limited use of the NanoVNA Saver computer program. Because it is so easy to use, I will continue to adjust/improve antenna parameters on comparison basis, without caring about the exact values the program shows.

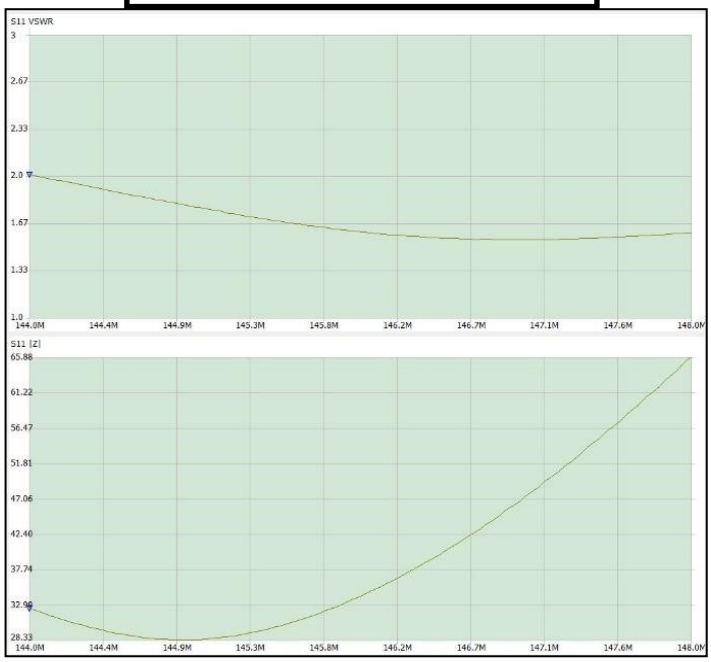
A light came on in my mind when the author of the buggy computer program himself wrote: “Windows build seems to have trouble, don't know if working as I’m lacking windows…” at https://github.com/NanoVNA-Saver/nanovna-saver/releases.

To make an honest evaluation of the NanoVNA Saver program, I also tried a 144 MHz antenna, which I know is tuned and works very well. This time I no longer obtained the discrepancies that I had under 30 MHz. The two computer programs and the NanoVNA v2 instrument itself showed exactly the same values;

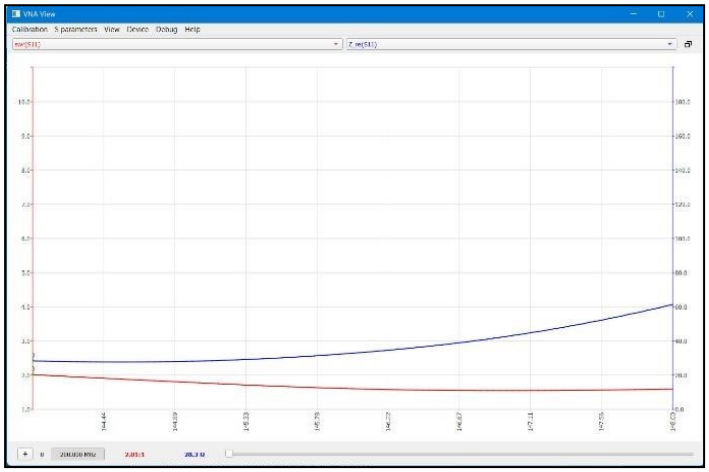
The fact that for some antennas I have the same indication does not necessarily make me trust the results obtained with NanoVNA Saver anymore. I started to use VNA QT more, which automatically loads the same frequency limits for the sweep as the loaded calibration.

~ Daniel VE7LCG

NanoVNA Saver program



VNA QT program



...more from

A rant about cheap encapsulated diode ring mixers

Another look at a previous Communicator article

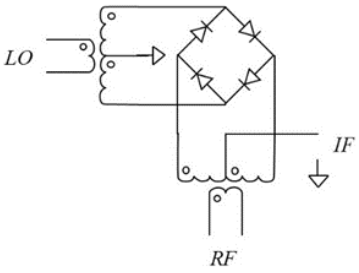
By DANIEL ROMILA VE7LCG

Daniel Romila VE7LCG with a follow-up on an earlier article.

Introduction: This article does not require reading the material but it gave me the idea to re-explore the subject of the article "Experimenting with a simple mixer", by Kevin McQuiggin VE7ZD/KN7Q, in the March -April 2023 edition of The Communicator, page 19, in the article I saw a similar experiment with what I did a long time ago, except that I remember paying much less for the encapsulated diode ring mixer than the author of the article. His article is available at:

https://ve7sar.blogspot.com/2023/02/another-big-issue-communicator-digital.html

We are talking here about a double balanced diode ring mixer, having the schematics on the left. The four diodes act as switches, activated by the signal coming from LO (local oscillator). The external input is RF and the output is IF (intermediate frequency). Usually, those mixers were used in direct conversion receivers. The IF is the result of the sum or the difference between the input RF and the local oscillator LO. For zero IF – that means audio, it means that one can directly connect to an audio amplifier – the difference between RF and LO is exactly the modulation of the input signal. For example, if we know we have a medium wave commercial station at 800 KHz nearby, in fact that station has the carrier at 800 KHz, carrier that is modulated with amplitude modulation. Subtract the carrier of 800 KHz, and one can obtain the

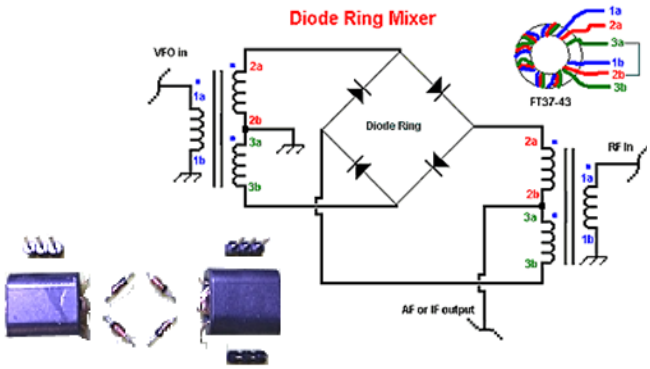


audio that was transmitted, the modulation, in plain English, the voice of the speaker, songs, and so on. I took the schematics from:

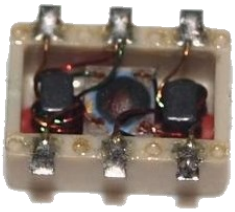
https://rickettslab.org/bits2waves/design/mixer-discrete/mixer-discrete-theory/

which presents in detail the theory about such mixers.

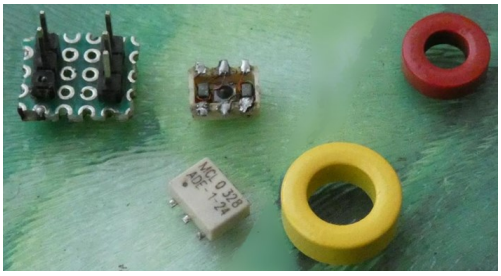
Those double balanced mixers were frequently done with discreet components, with diodes that had to be matched and wiring done on two separate toroids, which themselves had to be selected according to the frequency and power used. The circle next to the coils indicate the beginning of the wiring. Such a discrete double balanced ring diode mixer is presented by Rob Powell at: https://robs-blog.net/2016/03/19/diode-ring-mixer/



It is easier to experiment with ready made encapsulated double balanced diode ring mixers, like SBL-1 (left) or ADE-1-24 (right):



On aliexpress.com the SBL-1 is around $10 CAD (=7.35 USD =7 EURO =133 ZAR) and the ADE-1-24 is around $4 CAD (=3 USD = 2.77 EURO = 53 ZAR), in June 2023, shipping and taxes included.

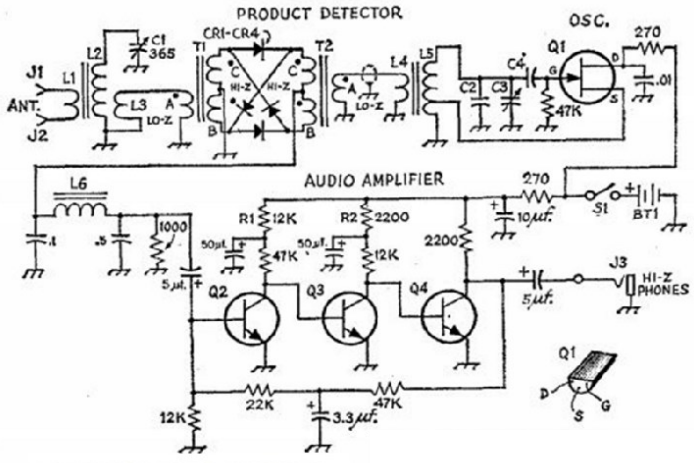


I had to mount the ADE-1-24 on a support board, in order to use it in an electronic test breadboard.

By far, the solution of using discrete components is way cheaper, and it did not require me to buy anything. I could play with mixing and matching diodes, four of a kind. I tried 1N4148 (switching Si diode), 1N60 (Germanium), and 1N5711 (Schottky).

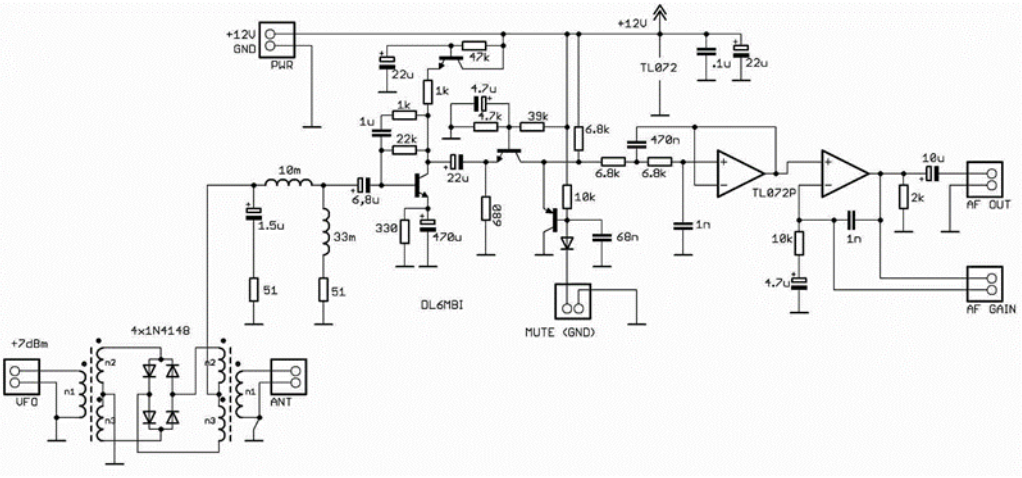
Depending on the diodes used, they have a different required voltage to open them. The local oscillator must be capable of providing an adjustable 3 Volts peak to peak. The higher the voltage, the higher the sensitivity of the mixer, but also the noise level.

Some simple schematics for direct conversion receivers:



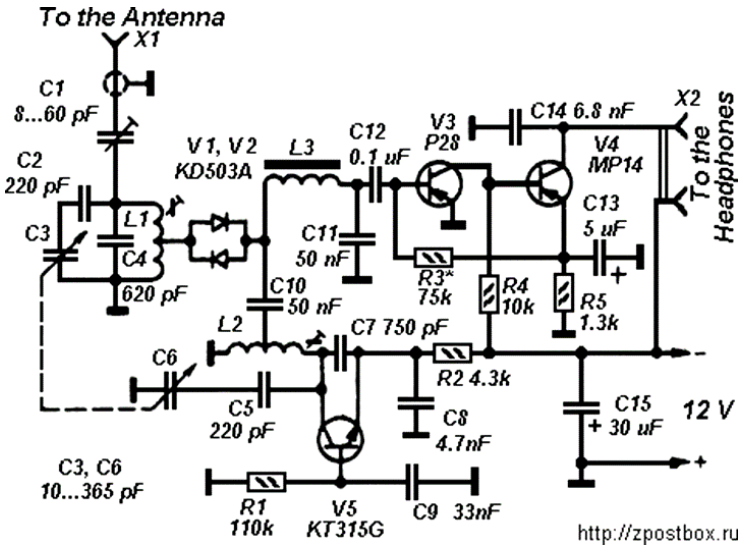
DC RECEIVER FROM 1968 PAPER.

More info at: https://soldersmoke.blogspot.com/2020/08/presence-absence-and-direct-conversion.html

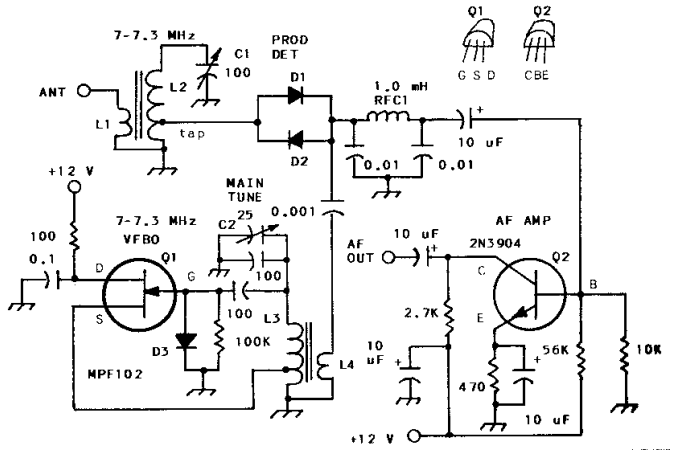


From: https://www.dl6zb.de/DCTRX/DCTRX.html

This kind of mixer requires some work and higher voltage from the oscillator. An easier diode mixer is the Polyakov mixer, which even allows the frequency of the local oscillator to be a half of the input signal, and still obtain the audio, as zero intermediate frequency.



From: http://zpostbox.ru/direct_conversion_receiver.html



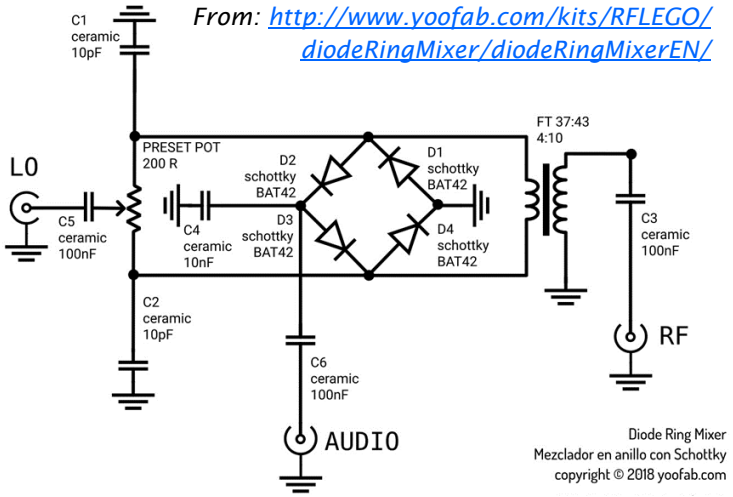
From: https://soldersmoke.blogspot.com/2011/07/doug-demay-and-polyakov.html

As an end note to this article, I must underline that the double balanced diode ring mixer is never so “balanced” to be usable for eliminating the carrier of an input SSB signal, and to obtain the upper and the lower side band components at the output (and eventually eliminate one of them with a crystal filter afterwards). Manually adjustable components for a nice “balance”, capable of effectively eliminating the carrier, must be added.

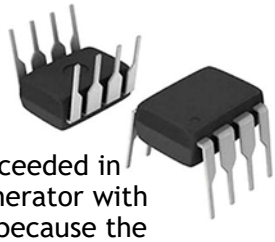
In this schematic, for SSB transmitter purposes, LO is the local oscillator, AUDIO is audio coming from a microphone amplifier, and RF is the output, DSB (double side band).

~ *Daniel VE7LCG*

From: http://www.yoofab.com/kits/RFLEGO/diodeRingMixer/diodeRingMixerEN/



NE602/612 and urban legends

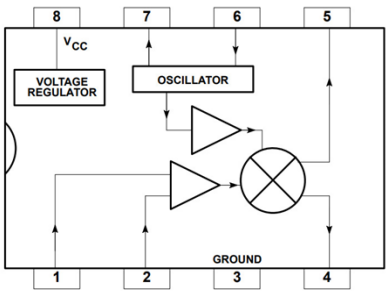


I remember the good projects I did in my younger years with the integrated circuit NE602, which also has the newer version NE612 (NE602 was working up to 45 MHz, NE612 is working up to 500 MHz). One can also buy it as SA612.

From its datasheet: *"The NE/SA612A is a low-power VHF monolithic double-balanced mixer with on-board oscillator and voltage regulator. It is intended for low cost, low power communication systems with signal frequencies to 500MHz and local oscillator frequencies as high as 200MHz. The mixer is a "Gilbert cell" multiplier configuration which provides gain of 14dB or more at 45MHz. The oscillator can be configured for a crystal, a tuned tank operation, or as a buffer for an external L.O. Noise figure at 45MHz is typically below 6dB and makes the device well suited for high performance cordless phone/cellular radio. The low power consumption makes the NE/SA612A excellent for battery operated equipment."*

It was good, simple and it worked. It worked to make simple direct conversion receivers and converters. Its oscillator stability was never great because the buffer after the oscillator is not great. It worked the best with crystals, not as a VFO.

My unhappiness was that I never succeeded in making a DSB (double side band) generator with NE602/612. It never worked for me because the signal from the oscillator went directly to the output. There was little carrier suppression, not good enough for radio transmissions. I always felt guilty and ashamed I was not capable of making it work.

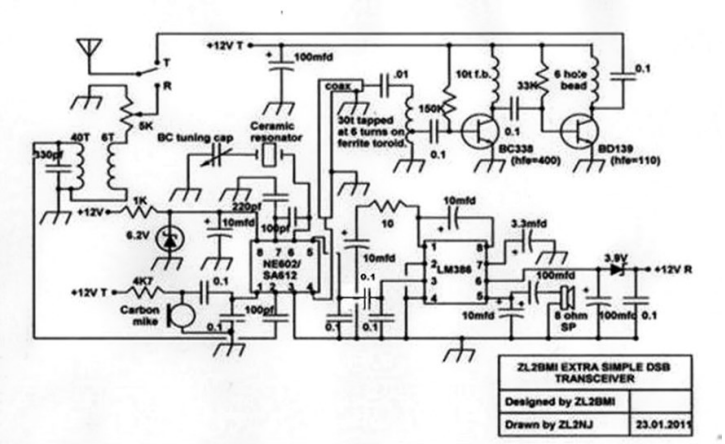


It was only recently that my sadness was relieved because I found information saying that NE612 did not work for others as a DSB generator either. DK7IH (Peter), some 3 years ago (in 2020, now we are in July 2023), measured the DSB performances and wrote in an article: "This is an outcome a little away from what can be expected from an SSB generator." (https://dk7ih.de/mixer-comparison-ne612-vs-an612/)

DK7IH identified another integrated circuit, AN612, similar to NE612, just not containing the internal oscillator. That made a lot of difference

in suppressing the carrier, not having the oscillator inside.

My suffering was caused by a schematic made by Eric Sears in 2011, ZL2BMI:



The article describing this simple DSB transceiver can be found at:

https://angelsnz.net/ZL3SV/qrp/QRP-rigs/zl2mbi-rig-%20circuit%20modification-212.htm

You can see in the above schematic there is no adjustment for suppressing the carrier.

Eric Sears ZL2BMI had originally conceived it in the mid 1980's as a very small rig to be used while bushwalking or hiking in his home country of New Zealand. It first appeared in issue 83 of SPRAT. It had an update featured some 16 years later in SPRAT 146.

People were building versions of it. In 2012 a serious builder, Dave Richards AA7EE, had the same problem, not being able to suppress the carrier as I had. I gave up, but Richard did not give up, and wrote to Eric, the original designer. The original designer answered that he did not have the same problem "probably because the power output was not much above 1.5watts. Then it started to show up – particularly with a 10-watt version". So, nobody measured the carrier suppression.

https://aa7ee.wordpress.com/2014/07/07/the-zl2bmi-dsb-transceiver-an-update/

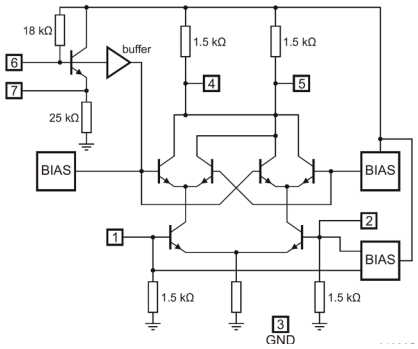
Eric offered some solutions, which did not work for me. David did not try it. I repeat:

You can see in the above schematic there is no adjustment for suppressing the carrier.

It seems other people also got frustrated with NE612, with its over published schematics of DSB transceivers which do not work well. Glen Leinweber VE3DNL, went further than just testing real integrated circuits. He made a SPICE model for NE612, and showed NE612 is just not designed for making a DSB transmitter. He wrote at the end of his article: *"The SE612 mixer was really meant for low-signal receiver mixing, not high-level transmitter mixing. The result is puny output power, in need of amplification and/or filtering. Don't expect the output waveshape from U5 to look as clean as this simulation. Balance is perfect here, not in real-life."*

https://www.qsl.net/kf4trd/ne602.html

NE602/612 is a double balanced mixer, which is called a Gilbert cell. From the NE612 datasheet, NXP manufacturer.

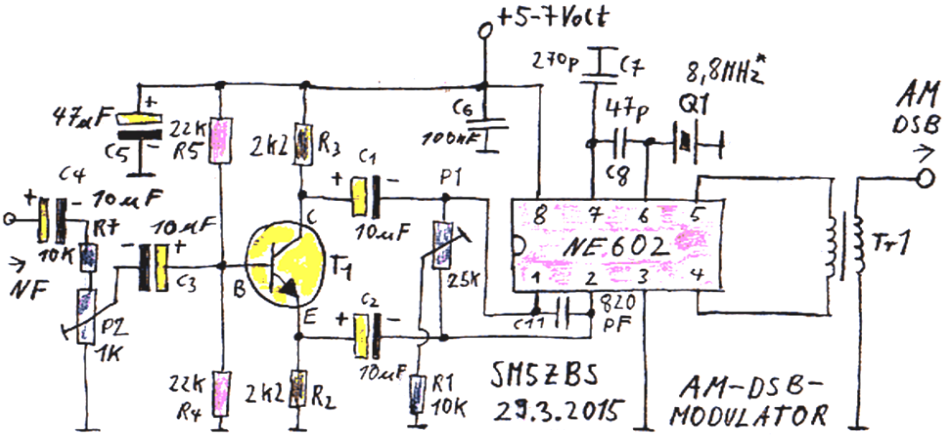


Pins 4 and 5 are outputs. If I could use both, maybe on a toroid, in a balanced way, I would obtain better results. Pins 1 and 2 are inputs and can accept DC bias. So, if I somehow put an adjusting element there, I can see on an oscilloscope the carrier increasing in level and decreasing in level, depending on external balancing the mixer.

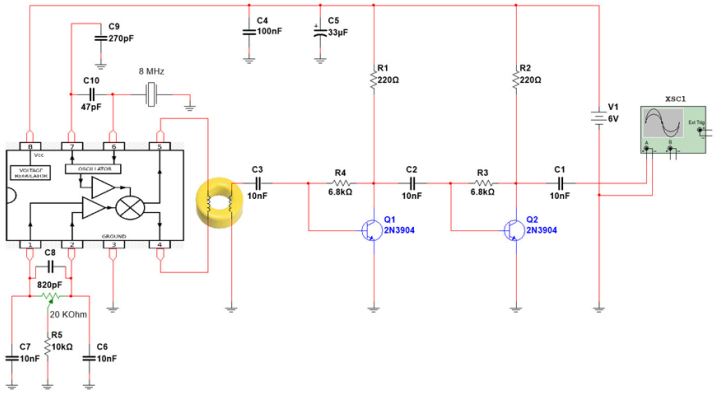
Volker Lange-Janson, SM5ZBS, had already this idea in 2015 *[see the schematic top next page]*.

https://elektronikbasteln.pl7.de/am-modulation-mit-einem-sa612-sa602-ne612-ne602

He made all kinds of measurements about modulation. I decided to go further myself, from the above schematic. I am not interested in how good the modulation is, but I am interested to find out if the suppression of the carrier is OK or not. I needed some amplification at the output, to be capable of seeing the signal on an oscilloscope. I built this schematic on the breadboard. I omitted the first audio transistor, and I put pin 1 and 2 (inputs) to ground, through 10 nF capacitors, to kill any RF that



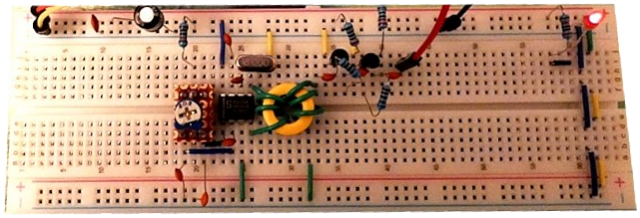
would enter there. I used two simple stages for amplification after the toroid. I drew the schematics in Multisim 14.3 and on top I put a layer with pictures, to have a clear schematic below.



The result of balancing NE612 with the 25 KOhm (20 KOhm in my case, I did not have a closer value) from the schematic of SM5ZBS was disappointing. When balanced as well as I could, there was still some 25 mV on the oscilloscope (after two amplification stages). This value makes sense only if compared with some 80 mV when the semi pot was forced to one extreme, to completely take the NE612 mixer out of balance. That is less than 4 times adjusting effect. I am using it with the 4 diode ring mixer, where the difference is like from night and day. From seeing Volts to seeing nothing (too low for the oscilloscope's sensitivity), when balanced.

But this experiment was still not exactly relevant, because it was still possible that the mixer was so well balanced internally that the external elements did not affect it much. I had to try it with audio input too, 30% to 100% modulation, to see the strength of the output signal in comparison with the approximately 25 mV carrier that I cannot get rid of.

I completed my schematic with the one transistor in front, for audio amplification. I eliminated the 10 nF capacitors which initially shorted the NE612 inputs to ground, to allow those inputs to have all the audio to them. They continued to be shorted one to another with 820 pF, so RF is less of a concern for entering through the input pins.



I put up to 500 mV, 1 KHz audio input to the first transistor. The first transistor "amplification stage" does not amplify, it just provides two identical audio signals from one, in opposite phases, as required by the two inputs of NE612.

The maximum signal that I could obtain out, after modulation, was less than 250 mV. So, 250 mV (or less) with modulation, and 25 mV unwanted carrier. That is less than 10 times, in voltage ratio, and that is not great. It is more of a "proof of concept" that DSB signals can be obtained, than something for practical use. A good voltage ratio would be between 100 and 1000, or more.

I just wonder how many schematics were simply bad designs and consumed my time and nerves at the beginning of my amateur radio building because everybody praised those schematics, everyone published "improved versions" of them, but they were simply crap (pardon my French!)

~ Daniel VE7LCG

…more from

A Korean soap opera

with an amateur radio activity flavor

By DANIEL ROMILA VE7LCG

Daniel Romila VE7LCG has a look at the lighter side of our hobby.

If you feel like seeing a low motion romance, with some old radio transceivers in it, "Ditto" is the movie for you. It is a Korean movie made in 2022.

The amateur radio transceivers are operated by two characters: a boy and a girl. Both of them are students. The idea is that somehow the pair of transceivers act like a time machine, because one operator is in 1999 and the other in 2022. It takes some time for them to understand, but the girl gets it first, being a student in sociology and not in mechanical engineering, like the boy is. It seems this time the saying "useful like a social worker, honest like a government worker" is not true at all.

All during the movie I felt like shouting "arrest them! Put them in jail!" because:

- They were not authorized radio amateurs.
- They never connected any antenna to their transceivers.
- They repeated CQ CQ several times, although it was clearly a directed call, not a general one.

To make a more artistic impression, the transceivers were old, analog type. Yes, I know, the newest SDR transceivers do not impress anyone any longer, and lay people might want to open cans with them instead of using them for radio communication.

And if we got into communication, radio or not, the whole movie is about that he wanted to say, but he didn't, she wanted to communicate, but she didn't.

You got it, it is a soap opera stretched on for some 90 minutes. It took me a lot of effort to stay awake. Suddenly, at the end, in the last ten minutes, the movie became good. It explained everything (I'm afraid it overexplained) and it became a happy ending from a sad story.

Usually, I do not spoil the plot when I talk about movies, but I really cannot recommend you watching this incredibly slow movie.

If you want to learn more about "Ditto" from 2022, you can find information at:

https://www.imdb.com/title/tt22872370/

Of course, many of the readers will tell me the idea of using a radio transceiver as a communications time machine device was used in other movies before "Ditto", like in "Frequency" from 2000.

Do not confuse this "Frequency" standalone movie with an abandoned TV series with similar name.

https://www.imdb.com/video/vi3265790233/?ref_=nv_sr_srsg_1

~ Daniel VE7LCG

And for more ham radio on screen—coming soon to a theater near you…

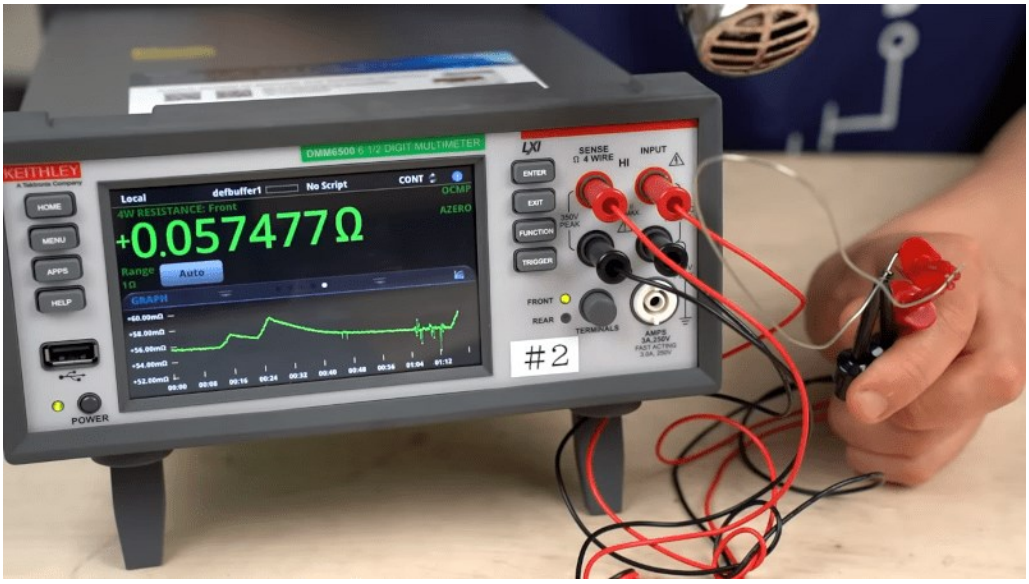
Lightforce Pictures brings you a 1980s Sci-Fi Psychological Thriller ***"Roswell Delirium"*** *starring Kylee Levien, Ashton Solecki, Arie Bodenhausen with an All Star cast featuring Anthony Michael Hall, Lisa Whelchel, Dee Wallace, Reggie VelJohnson, Sam Jones. Also co-starring Ryan Kennedy, Kayden Tokarski, Georgia MacPhail, and Romyn Smith.*

During the 1980s the US is hit by a wave of nuclear attacks, and after the fallout those who remain pretend like everything is normal even though they are all experiencing radiation poisoning. A young girl named Mayday tries to make contact on a series of ham radios with her father who is in space on a shuttle mission. Instead of making contact she receives a intergalactic distress call from space that leads her on a journey to Spacerock, the land where Area 51 once was. She is exposed to severe levels of radiation and within days all of her organs start to fail. Knowing that medical treatment won't help her mother Wendy brings her back to Spacerock to give her to the aliens in hopes that they may be able to save her.

~

Watch those 1% resistors

by HACKADAY / AL WILLIAMS



Decades ago, electronic components were not as easy to acquire as they are today. Sure, you could get some things at Radio Shack. But you might not have many choices, and the price would be on the high side. TV repair components were another option, but, again, big bucks. Some places sold surplus parts, which could be cheap. These often came from manufacturing runs where a company bought 10,000 components and made 8,000 products. But today, you can order parts inexpensively and get them on your doorstep in a day or, sometimes, even less. Are these inexpensive parts really any good? [Denki Otaku] likes to find out. In a recent video, he checks out some Amazon-supplied 1% resistors to find out how good they are. You can watch his results below.

He starts with two resistor kits and examines them quite closely. For example, a magnet revealed that one brand of resistor had iron leads which are not as conductive as copper leads. They look the same because they are both coated with tin, but the magnet tells the difference.

The Elegoo kit measured the expected resistance value within the tolerance band. The sample size was a little small to draw a solid conclusion, but it does look like the resistor were well within their advertised tolerance. The Longrunner resistors, however, did not fall in range. Some of the resistors were within 1% of the marked value, but others were as far out as 1.4%. That doesn't sound like much, but if you bought them for their 1% tolerance, a 1.4% error is way off the mark.

We liked the test jig he built to do the four-wire resistance measurements more easily. Simple but effective. He did some experiments with hot air to determine the temperature coefficient and the power handling capability of the resistors. That led to an accidental smoke release. Later, he had more of a planned smoke release.

If you need general-purpose resistors that are within a few percent of their marked values, these kits are probably fine. But if you are relying on precise values, you might be disappointed. On the other hand, you would probably hand-match anything important, anyway, but it is still good to be aware that the markings on the resistors might not reflect reality.

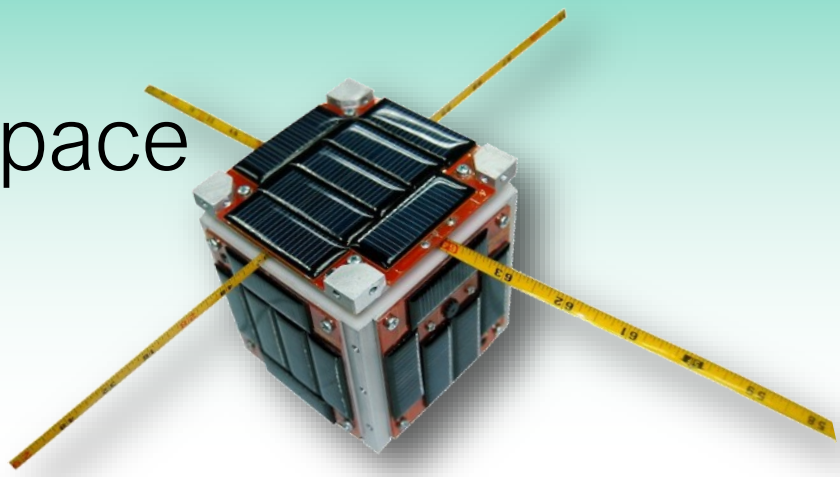
We recently saw a case where being out of spec with cheap parts was much more dangerous. If you want to know more about 4-wire resistance measurements, you are in the right place.

~ Hackaday / Al Williams
Watch Those 1% Resistors | Hackaday

Democratizing space

One picosatellite at a time

by TOM NARDI



There was a time when putting an object into low Earth orbit was the absolute pinnacle of human achievement. It was such an outrageously expensive and complex undertaking that only a world superpower was capable of it, and even then, success wasn't guaranteed. As the unforgiving physics involved are a constant, and the number of entities that could build space-capable vehicles remained low, this situation remained largely the same for the remainder of the 20th century.

But over the last couple of decades, the needle has finally started to move. Of course spaceflight is still just as unforgiving today as it was when Sputnik first streaked through the sky in 1957, but the vast technical improvements that have been made since then means space is increasingly becoming a public resource.

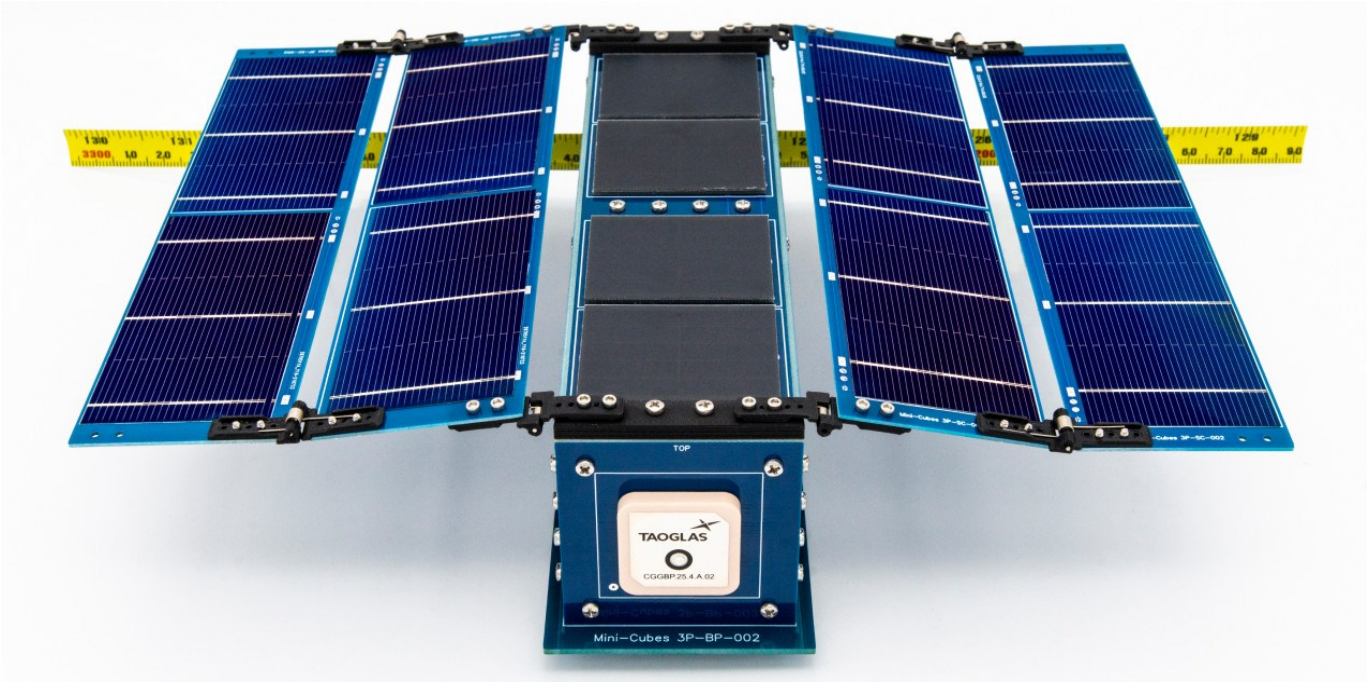
Thanks to increased commercial competition, putting a payload into orbit now costs a fraction of what it did even ten years ago, while at the same time, the general miniaturization of electronic components has dramatically changed what can be accomplished in even a meager amount of mass. The end result are launches that don't just carry one or two large satellites into orbit, but dozens of small ones simultaneously.

To find out more about this brave new world of space exploration, we invited Nathaniel Evry, Chief Research Officer at Quub, to host last week's DIY Picosatellites Hack Chat.

Nathaniel Evry

Quub is one of a new breed of companies that have sprung up recently which plan on leveraging small, low-cost, satellites to offer services which were once the sole domain of megacorps and governments. Specifically, they're working on a constellation of microsatellites that will allow independent monitoring of the Earth's natural resources.

It's perhaps no surprise that the chat started off with a pretty straightforward question: what actually qualifies as a micro or pico satellite? It turns out the ever-exacting NASA has a set of guidelines which broadly breaks down the overall SmallSat category



(spacecraft under 180 kilograms) down into the following classes:

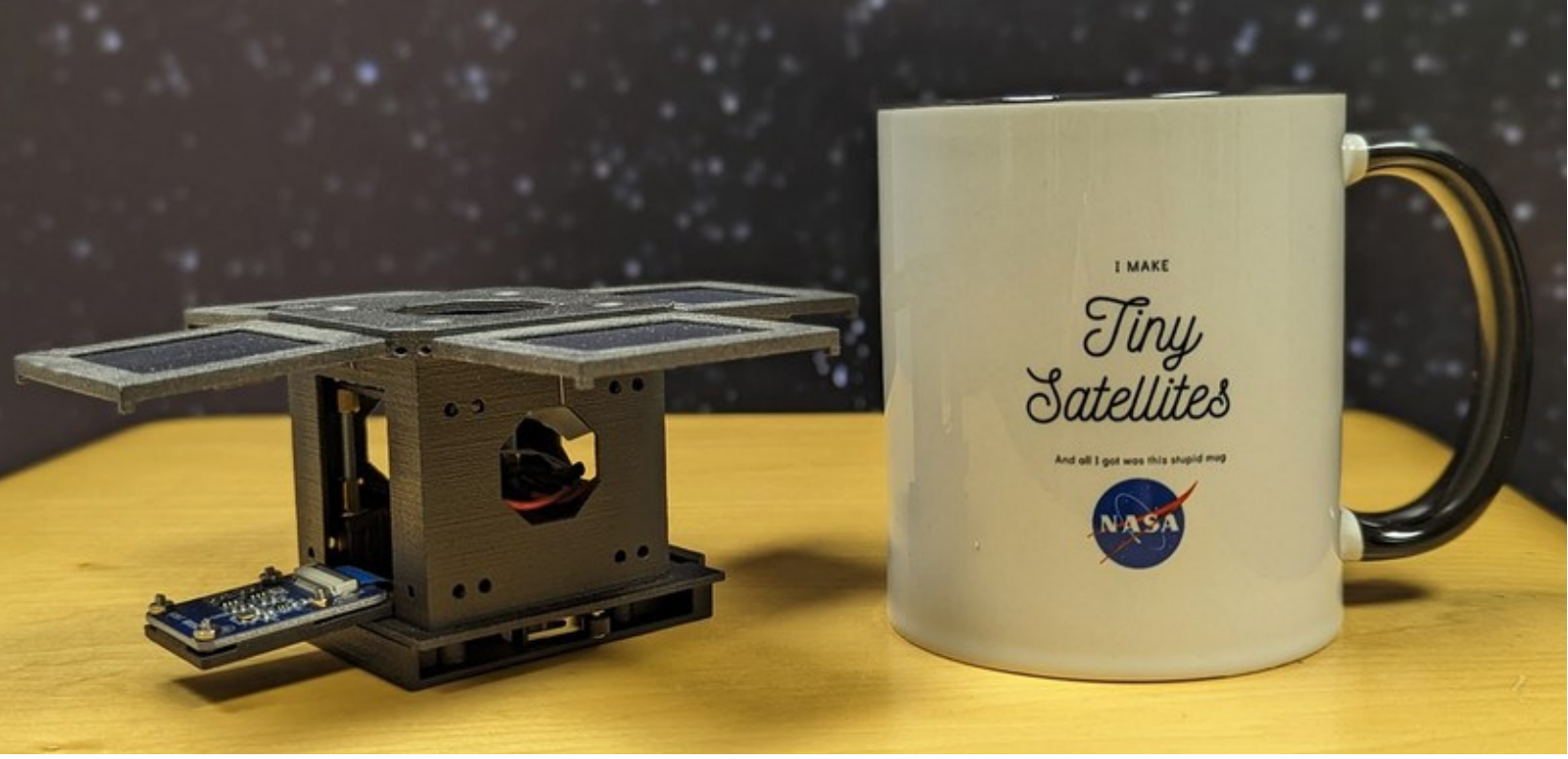
- Minisatellite: 100 – 180 kg
- Microsatellite: 10 – 100 kg
- Nanosatellite: 1 – 10 kg
- Picosatellite: 0.01 – 1 kg
- Femtosatellite: 0.001 – 0.01 kg

Outside of mass, there's naturally the size and shape of the craft to consider. Here Nathaniel points out that there are various standards for modular satellite frames, but generally speaking they describe cubic and rectangular layouts which can be efficiently packed and dispensed. A common theme among these sort of SmallSats is that they will unfold into larger and more complex arrangements after deployment, often by extending solar array "wings" and antennas. Speaking about Quub specifically, Nathaniel says their primary platform is officially referred to as a 6p PocketQube, which measures roughly 50 mm x 100 mm x 200 mm.

But it's more than just the size and shape of these satellites that benefit from standardization. In an effort to bring costs down even further, they commonly use commercial off-the-shelf components rather than the bespoke rad-hardened hardware which in decades past would have been a given for anything heading to orbit. Even if the final hardware does end up being a bit higher-end, Nathaniel says all of the prototyping work Quub has done so far has used the sort of hardware that you'd find in the average hardware hacker's toolbox — including the Raspberry Pi and RP2040 microcontroller.

As the conversation moved towards the internal construction of SmallSats, Nathaniel mentioned that one of their internal design goals is to avoid wires if at all possible as they can become a liability during launch due to vibrations and high G-force. Boards are designed to connect to each other directly whenever possible, and when the use of wiring is unavoidable, special high-strength connectors are necessary. Though in a pinch "a lot of epoxy" is also an option.

With so many details on how Quub's satellites are being designed and built, it's little surprise that some in the chat were curious about whether the company plans on releasing any of their work as open source. The answer turns out to be a qualified yes; while their current design still involves some elements they aren't ready to share publicly, Quub is in the



process of releasing earlier [generations of their platform under the MIT license](#).

Of course, despite the use of off-the-shelf components and 3D printed frames, we're not quite at the point where your average hackerspace is throwing together a picosatellite with what's in the beer fund. For one thing, the sort of space-rated Global Navigation Satellite System (GNSS) receivers you'd want onboard your craft to provide position and velocity data aren't exactly the kind of thing you can pick up from Micro Center. Similarly, while the [Applied Ion Systems](#) thrusters Nathaniel says Quub are using appear to be remarkably DIY-friendly, they still have five-figure price tags.

Arguably you could still fly without the niceties of thrusters or on-board navigation. After all, Sputnik did it. But then there's still the small issue of getting your homebrew bird into space. While SpaceX and other commercial entities have shaved a few zeros off of what it costs to put a kilogram into orbit, it's still a pricey proposition for an individual. But we're getting there, and that's extremely exciting. We're now at the point now where small startups and universities can pull it off, and with a bit of luck, citizen scientists and hackers shouldn't be too far behind.

We'd like to thank Nathaniel Evry for taking the time to talk about the exciting work happening at Quub and in the SmallSat community as a whole. Hosting a serious discussion about the future of DIY spacecraft is the sort of thing that we could once only have dreamt of, so we're thrilled to have had the opportunity to make it happen. We'll be keeping a close eye on Quub's open source efforts, and wish them the best of luck as they venture out into the black.

~ Hackaday / *Tom Nardi*
Democratizing Space, One Picosatellite At A Time | Hackaday

Quub's open source SpaceHex dev platform

Rescue assisted by amateur radio

From Vancouver's North Shore mountains

report and photos SHANNON CARNEGIE-PRESTON VA7SKX

Alex Schwarz VE7DXW, a local ham from North Vancouver, BC, embarked on an ambitious hike from Sunset Marina on a Sunday morning. He planned to use the Abyss Trail to reach the Unnecessary trailhead, then ascend to Unnecessary Mountain south of Lions Bay. His return route was set to follow the Howe Sound Crest Trail, culminating at the Cypress parking lot. His wife, Claire, was set to meet him there at 5 pm.

Starting from Sunset Marina, he commenced his hike up the North Shore Rescue Trail, transition to another trail, and had to navigate a bushwhack to circumvent several wasp nests to access the south end of the Abyss Trail. This trail had been re-established in 2021 but still required extensive improvements in most areas. "The trail is generally poorly maintained, although well-marked in most sections. Information about the trail was rather sparse, and the river often obscured and washed away trail markers, significantly extending the journey time," Alex reported. The distance from the Sunset Marina trail to the Unnecessary trail was only about 10 km, and Alex estimated it would take around 4 hours to complete. He had previously scouted both trailheads to ensure their feasibility, as this adventure had been on his bucket list for some time.

Around 4 pm, Dave (callsign VE7KZ) picked up a faint distress call on the VE7RPT repeater. Another ham radio operator, Jonathan Leung (callsign VA7JC), also caught wind of the transmissions from the repeater situated atop Mt. Seymour. Despite the static-filled message, it sounded like a plea for help. Dave and Jon deliberated over the heard message. The request was to relay a message to Alex's wife, and after a challenging exchange, VE7KZ managed to capture a phone number to reach Claire. Unfortunately, the altered destination to Lion's Bay had been garbled in the radio transmissions. Alex did mention something that resonated with Dave, hinting at a more pressing situation: "I don't need North Shore Search & Rescue… yet." Drawing from his Search & Rescue background, Dave recognized the urgency and promptly contacted the non-emergency police line to report a distressed hiker. This initiated North Shore Search & Rescue's involvement in locating Alex on the mountain.

Alex had been hiking throughout the day, carrying minimal water due to his

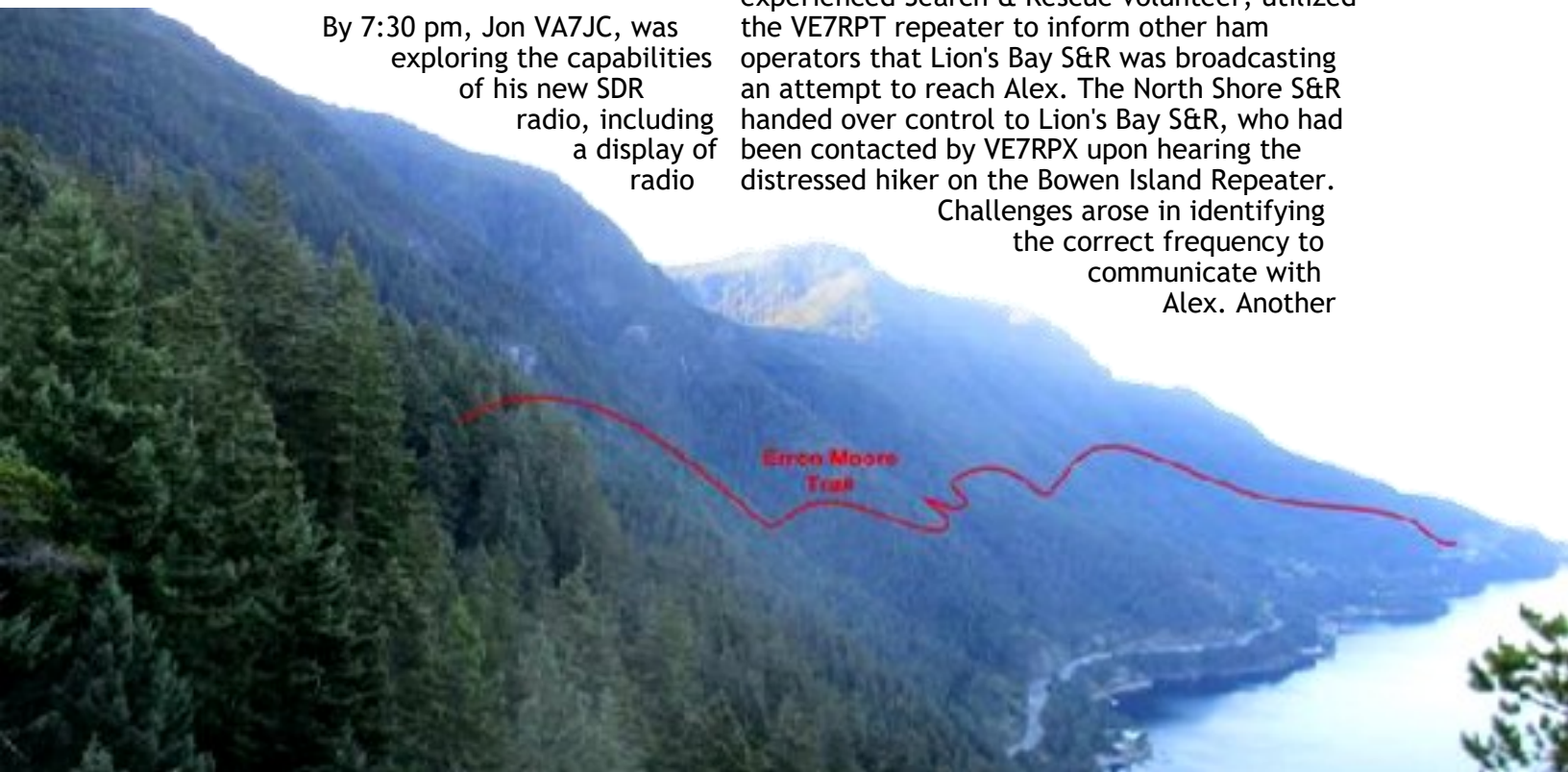
reliance on a filtration system and the anticipated water sources along the trail. The path led him through deep ravines and steep ascents, yet no water was found at the bottom. Navigating the treacherous Abyss Trail took far longer than expected – doubling the projected 4-hour timeframe. With daylight dwindling, compounded by dehydration, exhaustion, and wasp stings, Alex altered his destination to Lions Bay, which was a mere 5 km away and promised access to a river with running water about an hour from his location. Despite the absence of water, Alex and his small dog pressed onward. However, around 4 pm, dehydration and exhaustion halted his progress. Facing a 2-hour hike, he made the decision to call for aid due to leg cramps. "I had supplies to spend the night fairly comfortably, except for water."

North Shore S&R requested Dave to persist in radio attempts to reach Alex. Jonathan VA7JC, heard VE7KZ transmitting on behalf of North Shore S&R, but there was no response from Alex. Communication with the distressed hiker had been severed. Another ham operator, James (callsign VE7TG), monitoring the repeater, realized the loss of contact. He endeavored to reestablish contact by manipulating his beam antenna from his Vancouver Island residence to point at the vicinity between Lion's Bay and Cypress Mountain. Despite his efforts, no signal was detected.

By 7:30 pm, Jon VA7JC, was exploring the capabilities of his new SDR radio, including a display of radio frequency modulation known as a "waterfall." This radio granted him visibility into the entire 2 -meter band. Observing spikes indicative of transmissions, he managed to isolate a signal from Alex! This signal originated from Bob VE7RPX, a well-known operator in daily and weekly radio nets. Bob facilitated communication between Alex and the Squamish RCMP in the Lion's Bay region. They discussed Alex's supplies, potential injuries, and the feasibility of a rescue mission. When VA7JC informed VA7KZ that Alex had been heard on the Bowen Island Repeater, specifically VE7DXW on 146.720, the original Search & Rescue efforts were resumed, guided by North Shore Rescue's directives. North Shore Rescue dispatched a helicopter from Talon Helicopters to locate Alex.

The location's lack of cell service rendered smartphone-based GPS coordinates unattainable. The handheld radio Alex employed to make contact became crucial for his rescue. The North Shore Search and Rescue manager coordinated with VE7KZ over the phone, relaying questions to Alex like "Can you hear the helicopter? In which direction?" and receiving instructions such as "It's still too far south; tell them to head north." Eventually, Alex caught sight of the helicopter, his cheers confirming his location.

With the search culminating in success, a rescue operation ensued. Richard VE7XU, an experienced Search & Rescue volunteer, utilized the VE7RPT repeater to inform other ham operators that Lion's Bay S&R was broadcasting an attempt to reach Alex. The North Shore S&R handed over control to Lion's Bay S&R, who had been contacted by VE7RPX upon hearing the distressed hiker on the Bowen Island Repeater. Challenges arose in identifying the correct frequency to communicate with Alex. Another



operator, Dan (callsign VE7VU), intervened with a solution – the repeaters were interconnected! The input frequency for Bowen Island was replicated on both 146.720 and 147.260.

Bob VE7RPX, was unwavering in maintaining communication with Alex until the situation resolved. He suggested slight movement to potentially improve signal strength. Sometimes shifting even a meter can make a significant difference. Alex managed to ascend about 200 meters, and Bob confirmed clear communication. In the early morning hours, Alex spotted the lights of rescue hikers approaching him. They rendezvoused with the hiker and his dog, delivering fresh water and supplies to sustain them through the night. As Monday's sunrise broke, the group journeyed out of the woods together, reuniting with Alex's wife. Alex expressed his gratitude to North Shore and Lions Bay S&R, acknowledging that while his life might not have been in imminent danger, the assistance of Lions Bay S&R enabled him to self-evacuate, bypassing the need for medical intervention or an ambulance. His dog, Millie, also recovered swiftly.

He intends to review his emergency protocols, inform his family of his hiking plans, and enhance his supply readiness for future hikes, with the goal of avoiding future rescues. Alex extended his appreciation to all the amateurs who invested time and effort in relaying information and contacting relevant authorities. He emphasized the collaborative nature of the endeavor, highlighting the swift thinking behind configuring the repeaters for effective communication with helicopters, police, and rescue teams. He specifically thanked Dave VE7KZC and Bob VE7RPX, commending their contributions.

Alex also shared his thoughts on the Abyss Trail, praising its showcase of the rugged coastal range beauty. Despite its proximity to Vancouver, the area exudes a remote atmosphere. He aspired to advocate for improvements to the trail, including enhanced river crossings and better access to water sources. Alex even proposed renaming the revitalized trail the "Erin Moore Traverse" in honor of its transformation.

Amateur Radio Licensing is accessible to all. While anyone can monitor Amateur Radio frequencies for free, transmitting on these frequencies necessitates a license. Obtaining an Amateur Radio Operator License is cost-free and valid for life. Tests are administered at various locations multiple times a year. Those interested in learning more about obtaining a license or participating in Amateur Radio Events can locate their local club by searching "ham Radio" and their city. Surrey Amateur Radio Communications offers quarterly online courses; details are available at https://bit.ly/RadioCourses.

~ Shannon VA7SKX

Alex is happily reunited

EME and deep space probes

by KEVIN McQUIGGIN VE7ZD / KN7Q

I'm operating outdoors for the first stage of my 1296 MHz (23 cm) EME station's re-deployment. As shown in the lead photo, my EME gear is set up on a portable table right next to the 2.4m parabolic dish at my new QTH.

This has disadvantages (weather and climate: especially as we move into fall and winter) but it allowed me to get "back on the moon" sooner. The issue, of course, is feedline loss: I could locate my EME station in the shack, but the 75- to 100-foot cable run between the shack and the dish would significantly degrade both my RX and TX signals.

There are ways around this [1], but for expediency's sake I opted to operate outside for now and placed the table close to the dish to take advantage of short cable runs. I can trench from the shack to the dish and install underground cables early in the new year. The weather this summer has generally cooperated, and I have made several EME QSOs.

I am already looking towards next steps for my station. I've started to acquire gear for 3 cm (10 GHz) EME and have bought a good 3 cm LNA from a ham in Holland. I have a 10 GHz transverter enroute from a company in Germany as well. It should be here in a month or so. I will address the antenna situation later.

A serious issue at microwave frequencies is drift. Radios (either analog or digital) that will appear to be entirely stable on HF or even 2m can show significant drift on 10 GHz, on the order of tens or even hundreds of kilohertz. A reference oscillator such as a GPSDO (GPS-Disciplined Oscillator) is a definite requirement. I'll *definitely* need a GPSDO for my 10 GHz station.

While stable precision oscillators (often called OCXOs or TXCOs) are available at places like eBay, these units usually do not have sufficient accuracy and stability to be used on higher frequencies. Industry and academic researchers have replaced these standalone oscillators with GPSDOs as they provide far better accuracy and stability. Ironically, this is why so many OXCOs and TXCOs are showing up "cheap" on eBay in the first place.

Most “base station” rigs have a 10 MHz reference input these days, as do most good pieces of test equipment. A GPSDO will use GPS signals to generate an extremely accurate 10 MHz signal that can be fed into the rig, increasing its stability and frequency accuracy.

I expect that 10- GHz operation at VE7ZD will be a couple of years away, but an intriguing side option is that of receiving deep space probes on “X band” (7 – 11.2 GHz). Space probes have largely moved to 8 to 8.5 GHz for their telemetry and some science data links. All I’d need would be a receive downconverter.

A group of hams called the “Amateur DSN” (Deep Space Network), mostly in Europe, actively monitor space probes and report their results on https://groups.io/g/Amateur-DSN and https://uhf-satcom.com/dsn.

Figure 1 is a recent photo taken by STEREO-A, a probe that monitors solar conditions. Figure 2 shows detection the carrier of Mars Odyssey.

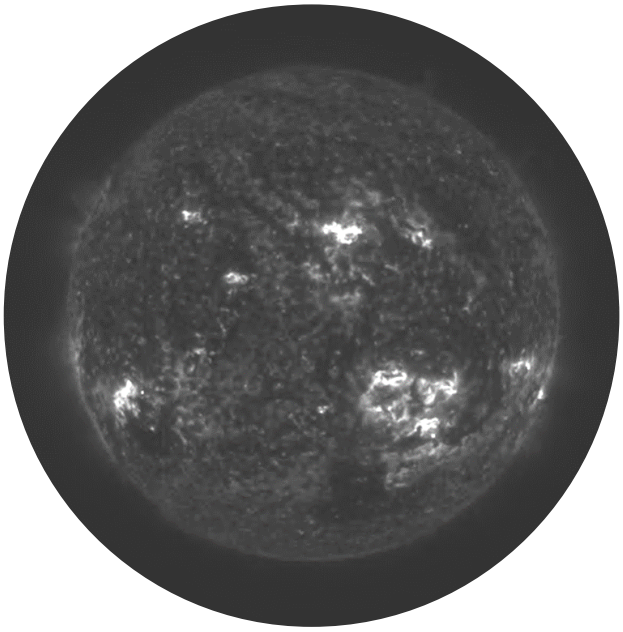


Figure 1 – Image from STEREO-A

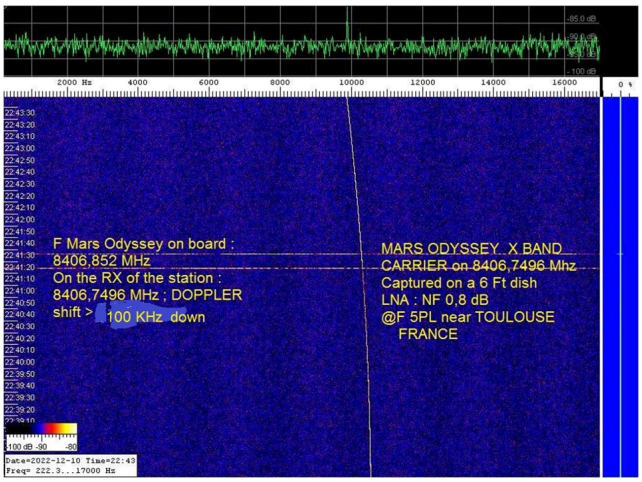

F Mars Odyssey on board :
8406,852 MHz
On the RX of the station :
8406,7496 MHz ; DOPPLER
shift > 100 KHz down
MARS ODYSSEY X BAND
CARRIER on 8406,7496 Mhz
Captured on a 6 Ft dish
LNA : NF 0,8 dB
@F 5PL near TOULOUSE
FRANCE

Figure 2 – Carrier from Mars Odyssey on 8.4 GHz

It would be very interesting to be able to monitor missions such as these directly. Tracking and receiver performance are critical to success, but I’m sure that I could learn whatever else I need to know to be able to receive these signals. It’d be the ultimate DX!

~ Kevin VE7ZD / KN7Q

References

[1] On the RX side, a good preamp right at the antenna can eliminate the need for hardline or top-quality (expensive) coaxial cable between the dish and the shack. For the transmit side I could locate the power amplifier at the base of the antenna and control it from the shack remotely. There are other interesting options too, like moving from an analog rig to a fully digital approach. Then I would just need to run Ethernet cable to the base of the dish. This will be the subject of a future “Radio Ramblings”.

[2] See https://groups.io/g/Amateur-DSN/topic/100106394#6437

[3] See https://groups.io/g/Amateur-DSN

RAC News

Highlights of the RAC 2023 convention and HARC conference

List of HARC Conference Presentations and where you can see them

Saturday August 19, 2023

8 am Bill Karle, VE1YY and Jason Ingraham, VE1PYE – "Try the 630m Band"
https://youtube.com/live/Zyo2QGYg_O8

9 am Dave George, VE1AJP – "Answering the Call"
https://youtube.com/live/KAQOHb2YsIY

10 am Fred Archibald, VE1FA – "Air-Sea Rescue in WW2 and the 'Gibson Girl' Radio"
https://youtube.com/live/tQdYY283uX8

11 am MWO Nathaniel Senff, VA7SNF – "Rebuilding Domestic HF Capabilities through CFARS"
https://youtube.com/live/B4GdoDQgdPs

12 noon President's Fireside Talk – Chaired by RAC President Phil McBride, VA3QR
https://youtube.com/live/uCuL-TFLZNY

1 pm Matt Boyle, VE1BSG – "Public Safety Communications: Past, Present and Future"
https://youtube.com/live/_W7U2ogUaf0

2 pm Al Penney, VO1NO -"Defeating Hitler's Chase Me Charlies"
https://youtube.com/live/6Lu9UDC74_Y

3 pm Radio Amateurs of Canada Annual General Meeting
https://youtube.com/live/pecGqnaNaVM

Sunday, August 20, 2023

12 noon Ducie Island" Gerry Hull, VE1RM/W1VE – "Remote Amateur Radio for Everyone: From Your Shack to
https://youtube.com/live/0QUNl97OWt4

1 pm Dave Goodwin, VE3KG – "The Remarkable International System of Amateur Radio Governance"
https://youtube.com/live/1r9s8Uiko4M

2 pm George Nicholson, N4GRN/VE1GRN – "Wild Side of Exotic DXpeditioning"
https://youtube.com/live/NVbtY6J9o9A

Halifax Amateur Radio Club's 90th Anniversary Presentations:

http://www.halifax-arc.org/2023/08/09/harc-90-th-anniversary-conferencepresentations/

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Around the GOTA Corner

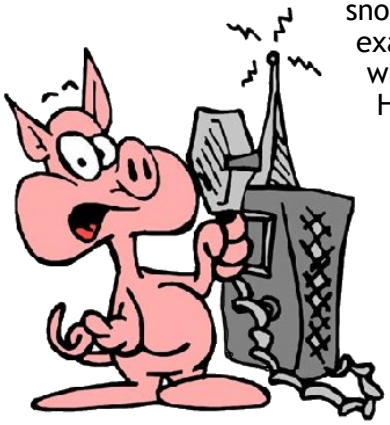
Harry the Ham

A Fable

by LARRY BLOOM VE7LXB

Harry the pig longed to be a ham. When Harry learned of an upcoming Amateur Radio course, he jumped in with four hooves and enrolled.

Harry liked to play dirty, so this porcine pragmatist memorized the answers rather than study the material. A few weeks into the course he decided it's snout or never and wrote the exam. Harry squealed with joy when told he had passed with Honours.



Harry pondered his first radio purchase but was confused by all the brands and prices. This prudent porker brought home the bacon, didn't live high on the hog, but he wasn't filthy rich. So, he ordered a cheap Boar Fang hoof held. When the unit arrived, Harry prepared to read the instructions.

"There's no manual!" he snorted.

For days, Harry fiddled with the knobs but heard only static – ham radio wasn't all swine and roses. Rather than wallow in misery Harry proudly framed his certificate and ordered his PRK4BNS call sign.

Alas, to Harry's dismay, his pen pals viewed his certificate as an empty achievement.

"But I'm a ham!" he cried.

"In name only!" his friends replied.

Sadly, dear readers, Harry's radio never got used. Surely a tragic twist to this piggy's tale.

Newbies, don't be a Harry. Find clubs that will get you on the air. And ham clubs, remember that the future of Amateur Radio is not simply adding new licensees. It's helping hams get on the air. Consider programming newb radios with local repeaters, organizing GOTA workshops, and setting up a GOTA Net for new hams.

Hogs and kisses everyone.

My email is GOTA@ve7sar.net

73,

~ *Larry VE7LXB*
New Ham Coordinator
Surrey Amateur Radio Communications

The unseasoned ham

GOTA Workshop and Net

Our GOTA Workshop on August 26th was well-attended. As always, Horace VA7HXB programmed participant radios, and nine new and unseasoned hams were instructed in basic HT usage, the ABCs of repeater and simplex frequencies, and VHF antenna options. They learned how to initiate contact using on-air etiquette and standard jargon, as well as Elmer availability, and basic survival communications.

The GOTA Net continues every Thursday evening attracting course graduates as well as interested hams who may be 'surfing' the frequency that night. Perhaps, the word is spreading to novice operators looking to connect. We had considered migrating to a repeater closer to GOTAs who live in the Greater Vancouver area. Frankly, I'm glad we didn't. In sticking with our club repeater in the 'burbs', we've motivated our GOTA's to upgrade their antenna and rigs. As such, we've received numerous queries on how to improve TX and RX signal strength.

One of our GOTAs, Warren VE7WLM, came up with an interesting solution. He took some 12ga NMD-90 "Standard House Wiring", cut single strands into pieces 4' long and then bent them into a 'V' and stripped the wire off the centre. Warren made 3 of these, and then placed them under a piece of metal he had lying around to electrically bond them all together to create a 6 radial ground plane that the mag mount could sit on. He tells us that he's getting great receive and was full quieting on the VE7RPT (Seymour repeater) recently. As well, he was able to activate one of the repeaters in Abbotsford, and the one at the top of the mountain near Blaine, WA. Right is a picture for reference.

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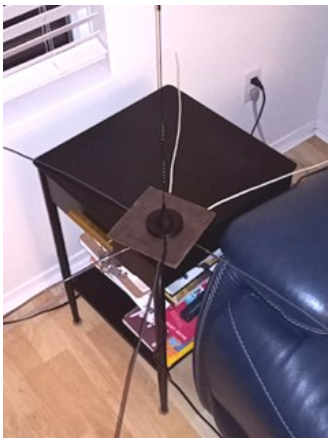


RTTY Rookie Roundup

Kudos to GOTAs Doug VA7JDJ and Derek VE7VPH who participated in the August Rookie Roundup RTTY Contest. Doug VA7JDJ and Derek VE7VPH were coached by John VA7XB in the setup, operation, and logging concepts. Regretfully, I had a last-minute commitment and had to pass.

When asked how it went, Derek replied:

"Yes, I did enjoy the contest and would do it again. John VA7XB provided excellent support and with the low activity level in the contest there was lots of opportunity to ask questions, try things out and recover from errors. A low stress way to experience a contest. The technology was interesting to me. In my mind RTTY fit a nice gap between CW and voice which made it very accessible to a person learning more about radio. Having the preset prompts set up in N1MM allowed the required communication protocol to be followed and freed up time to look for stations and work with the radio and N1MM logging. Quite remarkable to see text go from gibberish, to meaning to communication with another station."

Derek VE7VPH and Doug VA7JDJ

Doug seemed to enjoy the experience, as well:

"I enjoyed it because it showed a new way of communicating by radio. I am planning to participate in other RTTY contests as they come along, so not a one and done for me."

That's it for now. Catch you next issue around the GOTA Corner…

73

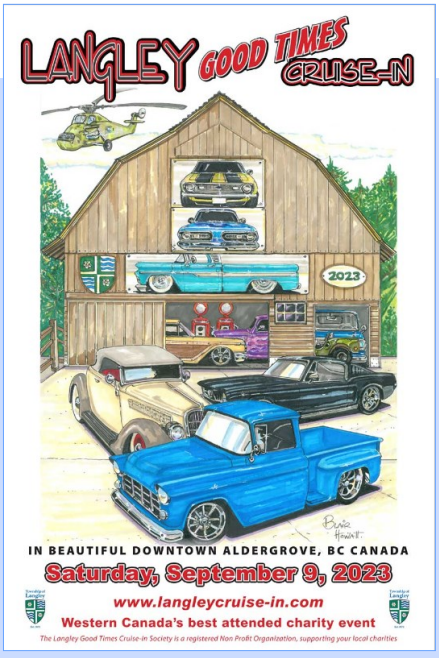
~ Larry VE7LXB

The Langley Cruise-in

The Langley Cruise-In car show is on again this year on September 9th. LARA will be present at the show information tent and will have a GOTA (Get On The Air) radio station set up for the public to try out in hopes of sparking some interest in the hobby. If anyone is interested in helping at the information tent (directing people to locations on the map we have) or at the GOTA station that would be greatly appreciated.

If you could let us know asap we can make sure we have enough people to cover the event. You can come for as long as you like, the show runs from 8-3:30.

~ Scott VE7CCY



Ham Radio

Outside the box

A 200ft wire antenna up zero feet

How Does it Perform?

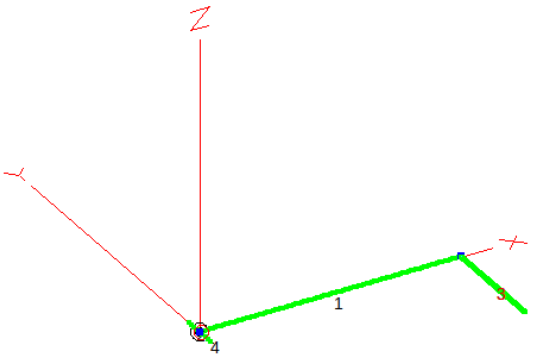
by JOHN CORBY VA3KOT

John Corby VA3KOT is a Canadian amateur radio operator based in Owen Sound, Ontario. He holds an Advanced certificate and is passionate about two things: operating outdoors and CW.

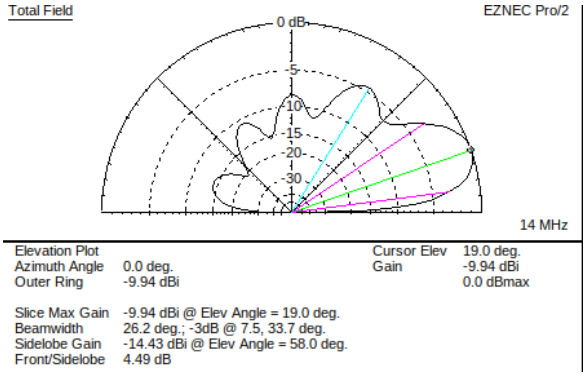
One of my local stores was offering 100ft reels of 16ga insulated wire on sale for a good price. I have bought this wire before and was very pleased with its flexibility – an important factor for field portable use where the antenna is subjected to constant winding and unwinding.

I bought two reels; that's 200ft. Then a random thought popped into my head. Two hundred feet is approximately three wavelengths on the 20-meter band. I keep a notepad in my shack for recording ideas, so I made a note to myself: "maybe worth trying a Grasswire antenna again".

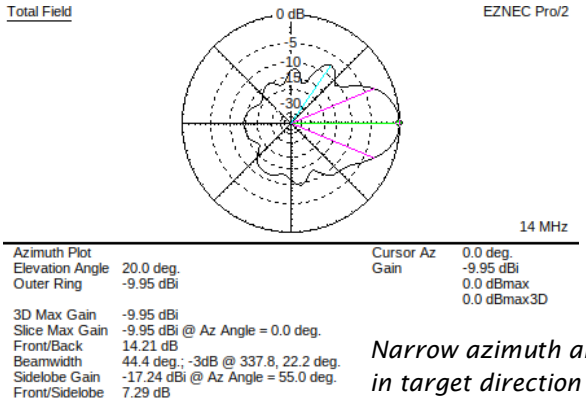
The wire extends 200ft across the grass.



Antenna config from EZNEC. The last 60ft had to lay at 90deg to fit on my lot.



Good low elevation angle but nearly 10dB loss.



Narrow azimuth angle focusses signal in target direction

I have posted about Grasswire antennas before. The concept of laying an antenna wire directly on the ground sounds crazy but it is actually very practical and has been proven many times over especially by K3MT (a web search will give you several accounts of his highly successful Grasswire trials from Bermuda).

Yes, an antenna wire laid directly on the ground is very lossy, but the losses are compensated by the highly directional signal beam (see diagrams below).

"But who has the space to lay out 200ft of wire?" you may ask. My home is on a generous suburban lot but I still had to lay out my Grasswire with the last 60 feet at a right angle. For field portable operation, it is usually easy to find a trail, or park with more than enough space to lay down 200 feet of wire.

Let me stress that this was an experiment. I won't be using my 200ft Grasswire on a regular basis. Having a license to transmit radio signals means (to me) a license to explore radio technology and try out new ideas.

I soldered the two 100ft reels of wire together and stretched them out in my backyard. The wire was then directly connected to the antenna jack on my field portable radio set. There was no coax involved; no ununs, baluns or transformers. For this improvised trial I laid out two 13ft ground radials and set my Yaesu FT-891 to 30 watts CW and keyed up. My recently upgraded auto tuner (now an LDG Z-11 Pro) easily found a match so I was good to go.

I tuned around the band and heard several signals. Then one particular station in Kentucky caught my attention. Dave (Des) N4IN was activating K-1267 My Old Kentucky Home State Park. When I heard him sign with a hunter I quickly threw out my callsign and was very pleased when I received a response.

N4IN was an easy 599 for me and he gave me a 539 report. I have had worse reports using my best field portable antennas so I was very happy.

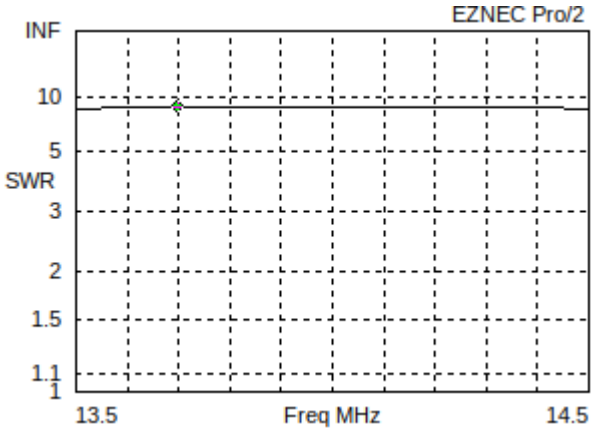
EZNEC says my 200ft Grasswire antenna has a loss of nearly 10dB so my effective radiated power was only 3 watts. But consider this. My 3 watts was being propagated in a beam 45 degrees wide.

John VA3KOT resides in Owen Sound, Ontario but is more often found operating CW out in the "Big Blue Sky Shack". He especially enjoys activating parks for the POTA program and blogging about his experiences at HamRadioOutsidetheBox.wordpress.com

If I had been pushing 30 watts into a quarter wave vertical antenna, with an omnidirectional propagation pattern, the portion of power radiated over that 45 degrees would be just about the same 3 watts!

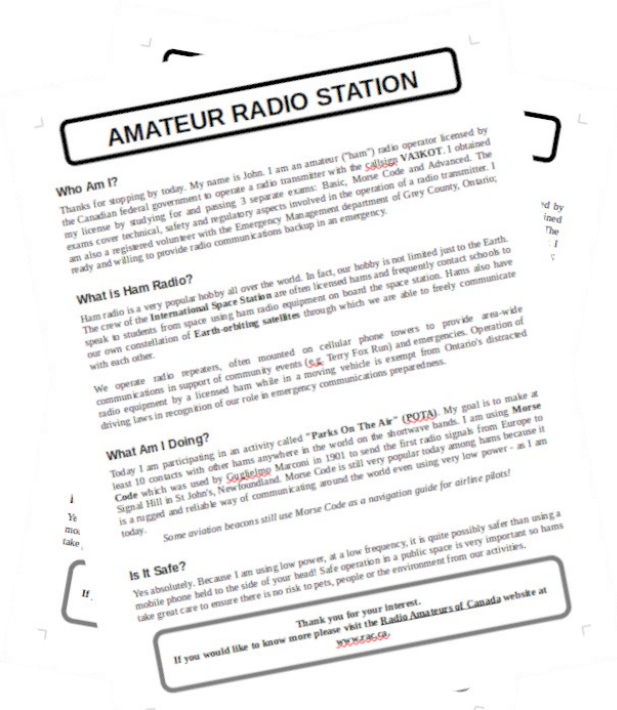
An important point to note here is that a Grasswire antenna must be at least one wavelength long. When the wire length is multiple wavelengths, the radiated signal becomes more focused. There is a lot of theory behind why this happens. If you would like to read a simplified explanation please check out my post entitled: "A Most Unusual Antenna" https://hamradiooutsidethebox.ca/2021/09/13/a-most-unusual-antenna/.

~ John VA3KOT



SWR below 10:1 easily handled by my LDG Z-11 Pro auto tuner.

Ham Radio? What's that?


AMATEUR RADIO STATION

Who Am I?

Thanks for stopping by today. My name is John. I am an amateur ("ham") radio operator licensed by the Canadian federal government to operate a radio transmitter with the callsign **VA3KOT**. I obtained my license by studying for and passing 3 separate exams: Basic, Morse Code and Advanced. The exams cover technical, safety and regulatory aspects involved in the operation of a radio transmitter. I am also a registered volunteer with the Emergency Management department of Grey County, Ontario; ready and willing to provide radio communications backup in an emergency.

What is Ham Radio?

Ham radio is a very popular hobby all over the world. In fact, our hobby is not limited just to the Earth. The crew of the **International Space Station** are often licensed hams and frequently contact schools to speak to students from space using ham radio equipment on board the space station. Hams also have our own constellation of **Earth-orbiting satellites** through which we are able to freely communicate with each other.

We operate radio repeaters, often mounted on cellular phone towers to provide area-wide communications in support of community events (e.g. Terry Fox Run) and emergencies. Operation of radio equipment by a licensed ham while in a moving vehicle is exempt from Ontario's distracted driving laws in recognition of our role in emergency communications preparedness.

What Am I Doing?

Today I am participating in an activity called "**Parks On The Air**" (POTA). My goal is to make at least 10 contacts with other hams anywhere in the world on the shortwave bands. I am using **Morse Code** which was used by Guglielmo Marconi in 1901 to send the first radio signals from Europe to Signal Hill in St John's, Newfoundland. Morse Code is still very popular today among hams because it is a rugged and reliable way of communicating around the world even using very low power - as I am today.

Some aviation beacons still use Morse Code as a navigation guide for airline pilots!

Is It Safe?

Yes absolutely. Because I am using low power, at a low frequency, it is quite possibly safer than using a mobile phone held to the side of your head! Safe operation in a public space is very important so hams take great care to ensure there is no risk to pets, people or the environment from our activities.

Thank you for your interest.

If you would like to know more please visit the Radio Amateurs of Canada website at www.rac.ca.

For the text of the handout, click on the graphic above.

Now we have moved into the summer season I have been getting quite a few folks stopping by while I am operating in a public park. Frankly, I prefer to be left alone to get on with my activation, but if somebody stops and starts to ask questions I feel I really should respond. Who knows, they may think my setup looks very suspicious and feel obliged to report their suspicions to park officials – or the police! Better to make them feel at ease and send them on their way. I am not sure if my explanations help though.

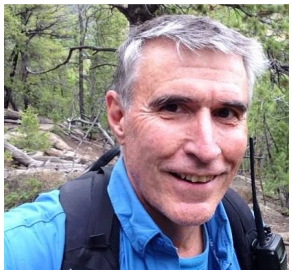
I was activating a park near home recently. It was a small park lacking any private spaces where I could go into stealth mode and be undisturbed. I had set up my station on a picnic table. My 17ft vertical antenna was mounted on the edge of the table with four 13ft radials spread out around the table. Things were going well with the activation when, out of the corner of my eye, I noticed a young family passing by. The father and kids went straight to their car but the young mother stopped and looked at my antenna.

I resolved that next time I would be prepared. So I wrote up an information sheet that I could print and offer to inquisitive visitors. I figure the genuinely interested inquirers will read the sheet and ask targeted questions that I will be happy to answer. Others, who just want to know what I'm doing – for whatever reason – will be discouraged by having to read a page full of verbiage, or will simply agree to take a copy of the sheet home to read.

The Colorado 14er Event

Ham Nation folks invited me on to talk about the Colorado 14er Event

by BOB WITTE K0NR



Bob Witte K0NR maintains a great blog site at https://www.k0nr.com/wordpress/

The Ham Nation folks invited me on to talk about the Colorado 14er Event last night. Thanks for the invite! This turned out to be a concise look at the 14er event with lots of great photos of past operations.

Here's the video (my segment was 20 minutes long):

We have lots of information on the event at ham14er.org.

The 14er event includes Summits On the Air (SOTA) peaks, which provide over 1700 summits to activate. (See the W0C SOTA web page or browse the SOTA Atlas.) The Colorado 14er Event was started in 1991, about 19 years before the SOTA program was set up in Colorado. As SOTA grew in popularity, this event expanded from just the 14,000-foot mountains (14ers) to include all of the SOTA summits in the state. We still call it the Colorado 14er Event because, well, that's where it all started and the 14ers are the iconic summits in the state.

Important: The recommended 2m FM frequencies are 146.58, 146.55, and 146.49 MHz, to align with the use of the North America Adventure Frequency for SOTA (146.58). The National Simplex Calling Frequency (146.52) may be used as appropriate. There will be plenty of action on the other ham bands, for more information see the operating frequencies page.

Resources:

Colorado 14er Event webpage – Everything to Know About The Colorado 14er Event

Beginner Guide – For the first-time activator

Ham14er Groups.io – Discussion Group for the event

Colorado SOTA groups.io – Colorado SOTA discussion group

Colorado 14er Event Task Force

info@ham14er.org

~ *73 Bob KØNR*

Check out Rob's book VHF, Summits and More: Having Fun With Ham Radio.

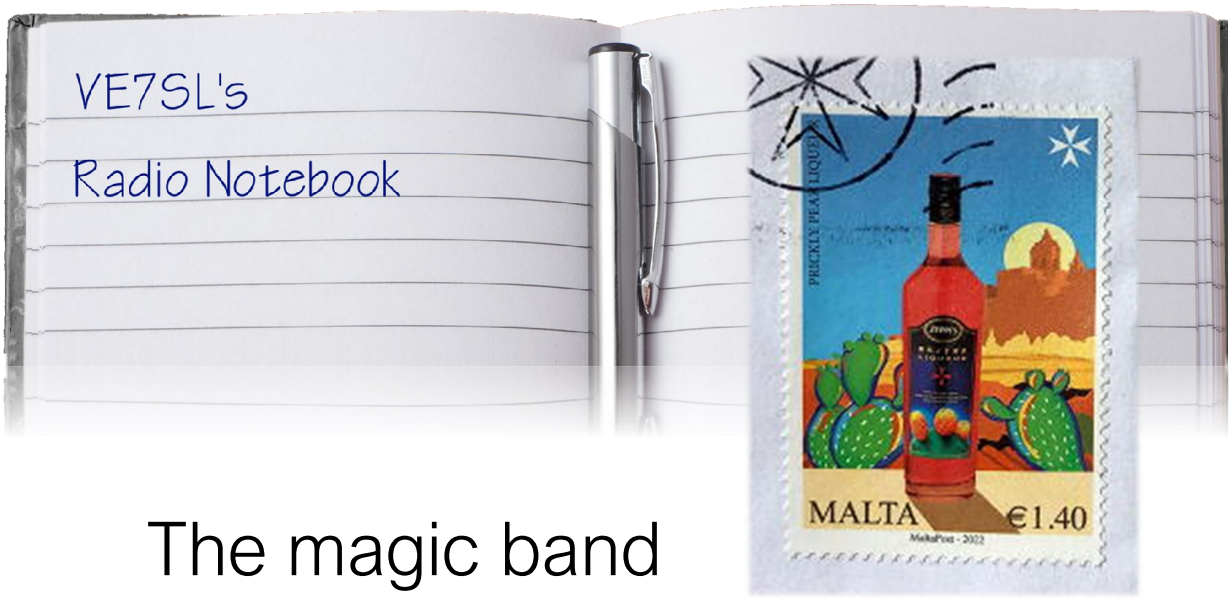
This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

SARC Trello site

What is Trello? According to their website, Trello is the visual tool that empowers a team to manage any type of project, workflow, or task tracking.

We recently launched a Trello site managed by Reg VA7ZEB to receive ideas and to permit our members to see some of the issues and ideas that we are discussing.

You can visit the site at: ve7sar.net/brainstorm



The magic band

Summer sporadic-e season

by STEVE McDONALD VE7SL

Steve McDonald VE7SL Reproduced with the author's permission, Visit The VE7SL Radio Notebook at: The VE7SL Radio Notebook and Steve's blog at VE7SL - Steve - Amateur Radio Blog

This summer's Sporadic-E season has pretty much wound-down once again. As E seasons go, this one ranked right up there with the worst of them but this comes with some provisos.

Over the past several years, my only interest has focused on Europe and Asia, looking for any DXCC entities that I have not yet worked and I tend to ignore most domestic openings unless the MUF appears to be climbing into the range of 2m.

There were several openings from here in British Columbia to most regions of the US and Canada, so many would likely disagree that it was a poorer season than normal!

Unlike last year when we had several good days to Europe over a two-week period, this year's fireworks were pretty much confined to **June 12**, when the somewhat unstable polar-path to Europe jumped from country to country for several hours. In spite of making 62 contacts to Europe, only one new country was worked when 9H1TX in Malta replied to one of my CQs! Other than him, there were no other signals being heard at the time but after our QSO, his fellow countryman, 9H1TX, also appeared ... so it was exciting to find two rare 9H1s in the 6m log! For about 4 minutes, the only two signals in my FT8 waterfall were both CQers from Malta! Note the power and antenna being used by 9H1LO ... it doesn't take much when the magic appears, albeit momentarily.

Last summer's E season was not as heavily influenced by the active Sun, unlike this summer's constant stream of solar flares keeping the polar regions anything but calm and quiet … a seeming requirement for good transpolar Es on 50MHz from the west coast.

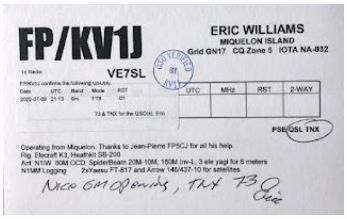
Last year produced 8 new DXCC entities and in most cases, like this year, signals were strong enough for CW but almost all DX prefers the few db advantage offered by the FT8 mode. Exchanges can be made MUCH more quickly on CW than the snail-pace of FT8. The addition of 9H1 brings my 6m DXCC confirmed total to 109.

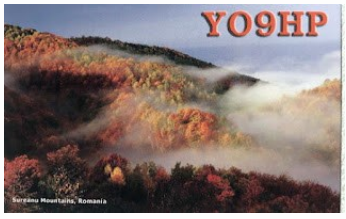
If Cycle 25 continues to grow as it has been (in small spurts), it's difficult to predict if there will be any long haul F2 propagation in the late fall or not. In previous cycles we've needed to see some steady flux values in the **200 or higher range for several days in a row**… at least for us here in VE7 land.

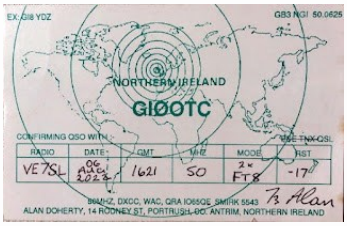
If the F2 MUF does indeed manage to manifest itself, we should expect to see early morning openings to the New England / NY regions with blowtorch signal levels before seeing the path crawl down the eastern seaboard then possibly into the Caribbean and South America. Later in the afternoon, expect signals from Japan and the far East for several hours up until sunset, once again at bone-crushing signal levels. There are few things in ham radio more exciting than experiencing 6m F2 and hearing the level of signal strengths that can be reached when operating near the edge of the MUF.

If not this fall then hopefully in 2024 for sure … but as of now, it's anyone's guess as to if or when the rare winter magic will appear once again!

~ Steve VE7SL







VE9KK

A multi-band condo antenna...

Beat the condo cops

by MIKE WEIR VE9KK

Mike Weir VE9KK was first licensed in 1989 and upgraded to advanced in 2000. He primarily operates contests both CW and RTTY.

Many Amateur radio ops now find themselves in a neighbourhood, downsizing to a condo or moving to an assisted living complex that is ham radio antenna unfriendly. I have lived in many antenna challenged, HOA and condo rules that outlaw antennas. But I have always managed to get on the air using HF and enjoy the hobby. Over the next few posts, I am going to share how I accepted the antenna challenge and kept the HOA hounds or condo cops from having their heads spin backwards. Today let's look at a situation that involves home HOA hounds or townhouse condo cops.

In the neighbourhoods I have moved to I always get a copy of the rules. (HOAs and condos have more pleasant words than rules) But let me start by saying I am not against having common understandings (rules) as it can control some funny things that can pop up in uncontrolled neighbourhoods or condos. In most of the rules I have read regarding antennas, it boils down to you can't have them due to safety, how they look and the size. The way I see it is if it's safe, no one see's it and it's small then we are good to go with an antenna!

The first big hurdle is out of sight, as with amateur radio an HF antenna can be a tough one. For 16 years I lived in a townhouse which was not antenna friendly. I found we had a very large

attic and then the next challenge was what to put up there for HF operations. What I tried was 2 mobile whips configured into a dipole. This had a very narrow bandwidth and only a single band as I could not set up more than one due to space and interaction. A band change meant getting up in the attic and doing the whip change. That idea was deleted due to attic heat in the summer and just getting up and down from the attic.

My goal was a multiband antenna that was small and could be left in the attic and forgot about. I committed to a dipole antenna from Alpha Delta the DX-EE model. This was a 10-40m antenna that was 40 feet long. Now my attic is nowhere close to being 40 feet long but I ended up installing it in a "Z" configuration. To secure the antenna in the "Z" configuration I used electric fence standoffs. Also, I added a 1:1 choke balun at the antenna feed point. This antenna served me without issue for years and it was out of the elements from the weather, out of sight and got me on the air. As a sidebar, I only transmitted at QRP levels as I did not want to have any issues with those on either side of us in the townhouse.

Some of the challenges were:

The antenna had a narrow bandwidth on 40m but the Elecraft K3 tuner looked after that. As well using the Elecraft K3 tuner I was able to also use the WARC bands as well.

I picked up very bad band noise from a Plasma TV but that was fixed with an MFJ noise-cancelling unit.

Getting the coax from the attic to the radio room. The room was on the second floor and I ended up putting the coax in the wall and out in the radio room.

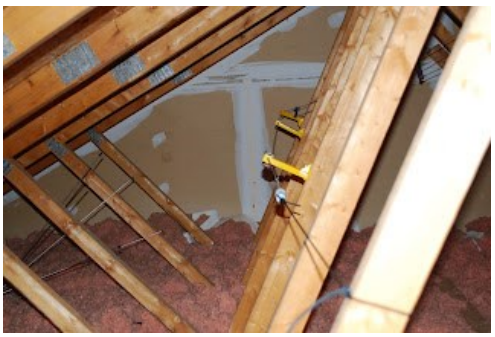
Securing the antenna for a "Z" configuration. As mentioned I used electric fence stand-offs.

Getting the best bang for each watt of power meant CW and not SSB. That began my journey of re-learning CW. Also fast forward to now there is also the digital modes you can use.

I want to dive into living in a condo and getting on the air. Many amateur operators at some time have found themselves moving into an apartment to save for a home or downsizing into a condo when the house has grown too big.

This lifestyle does not mean the radio hobby is tossed. Most of us find our radio hobby adds pleasure to one's day. For me when I was in a condo it meant just another hurdle to overcome toward getting on the air. In my readings, I have seen hams who have erected wire, mobile whips and so on. I have never tried any of these and if you have please do share what you have tried. The condos that I have lived in were heavy on condo cop protection and the list was long as to what could and could not be on a balcony. One of the items on the list was antennas and as for me, I look

Alpha Delta DX-EE



Electric fence stand-offs

DX EE

The MFJ loop covered and ready to go into service.

Yearly checkup

Changing the shape improves SWR

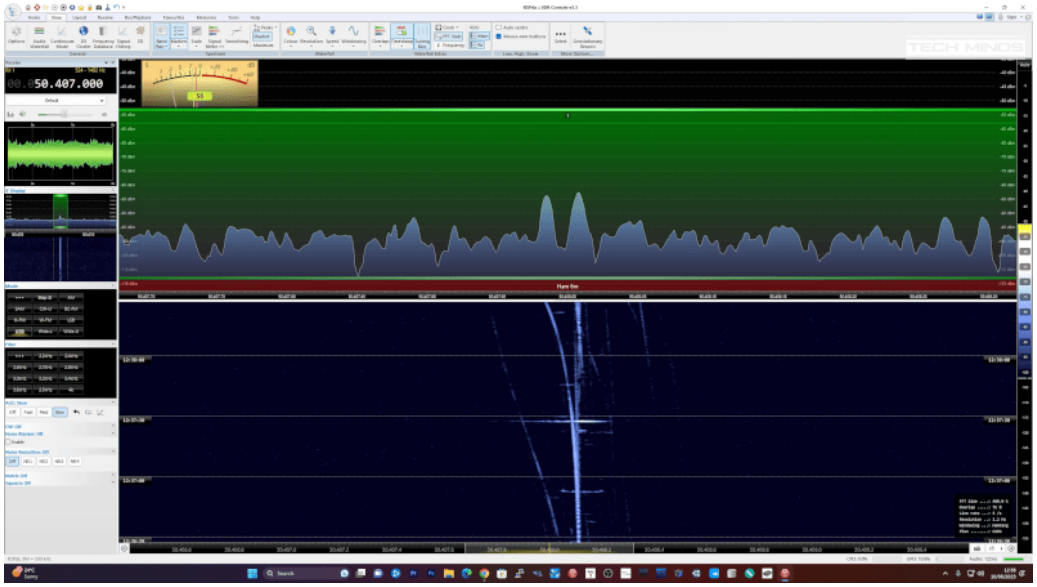
at that as where there is a will there is a way!

In all the condos I have lived in I have always had a balcony to take advantage of for an antenna. After investigating many antennas the best solution (a pricey solution) was a mag loop antenna for the balcony. It offered a small size, if needed it could be taken in and out from the balcony and as well its multi-band antenna. In the past, I have had mag loops such as an AEA isoloop, Chameleon P-loop and Alex loop. I planned to leave the loop on the balcony and not have to run in and out to tune the loop. I ended up purchasing the MFJ 1786 mag loop and this loop gave me the desired remote band tuning I wanted. I then purchased a tripod to mound the loop and next was how to conceal the loop. I ended up getting a patio furniture cover which looked great and to the condo cops, it was just another piece of patio furniture on the balcony. I was thrilled the cover did not affect the SWR at all as I was prepared to remove the cover during operation and then cover it once done. The mag loop had to be moved around the balcony for the best overall SWR. This took some time and once done I marked the balcony floor with a permanent marker. Also in the front of the loop is a round copper wire and by changing its shape also can help with improving the SWR.

This way when it was stored in the corner during non-use I was able to put it in the right spot for best operation. The loop was very fussy and putting the loop in the exact spot was important for the best possible SWR. The loop was tried both in the vertical and horizontal position. I was not able to get a decent SWR when the loop was mounted vertical. I ended up using it in the horizontal position. This was also great for the cover as it looked like a patio table I was covering. I used the Comet CTC-50M (flat coax cable) to feed out the sliding glass door so the coax would be permanent as well. This setup allowed me to place the antenna in position and start operating. Again in this configuration, I was strictly CW and I also added digital communications as well. I admit it is not an ideal situation but it got me on the air and making contact.

In my third and final antenna challenge post I want to share some other antennas I have tried some failed, some worked and others were crazy and worked. After using the loop for a short while I became very fast at tuning the loop. I also found in the summer if the humidity was high it would affect the SWR. Once a year I took the loop in for an inspection and remove any bugs that made the loop home.

~ Mike VE7KK



Detecting meteors with SDR

by HACKADAY / AL WILLIAMS

The simplest way to look for meteors is to go outside at night and look up — but it's not terribly effective. Fortunately, there's a better way: radio. With a software-defined radio and a little know-how from [Tech Minds], you can easily find them, as you can see in the video below.

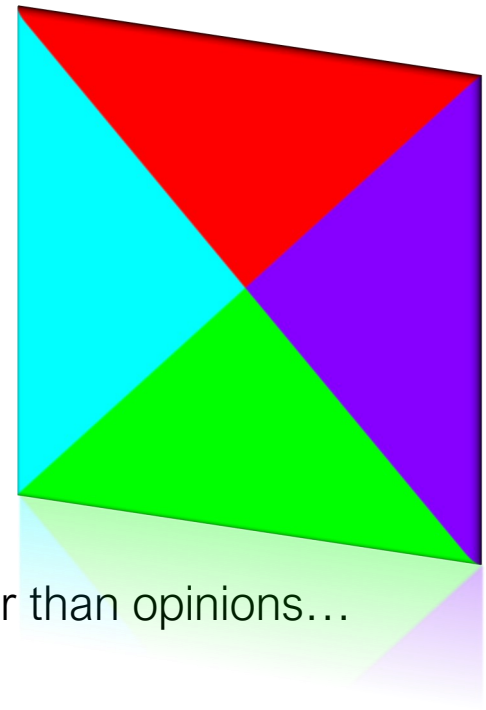
This uses the UK meteor beacon we've looked at before. The beacon pushes an RF signal out so you can read the reflections from meteors. If you are too far from the beacon, you may need a special antenna or you might have to find another beacon altogether. We know of the Graves radar in France and we have to wonder if you couldn't use some commercial transmitter with a little experimentation.

[Tech Minds] has some practical tips to share if you want to try doing it yourself. If you want to see what a detected meteor looks like, you can visit the UK beacon's gallery page.

We saw another presentation on the UK beacon earlier this year. Using commercial transmitters sounds like it might be easy, but apparently, it isn't.

~ Al Williams / Hackaday
Detecting Meteors With SDR | Hackaday

Foundations of Amateur Radio



Gathering data rather than opinions…

by ONNO BENSCHOP VK6FLAB

Onno Benschop
VK6FLAB
To listen to the podcast, visit the website: http://podcasts.vk6flab.com/. You can also use your podcast tool of choice and search for my callsign, VK6FLAB.

Full instructions on how to listen are here: https://podcasts.vk6flab.com/about/help

There's nothing quite as satisfying as the click of a well designed piece of equipment. It's something that tickles the brain and done well it makes the hairs stand up on the back of your neck.

If time was on my side and I wasn't going somewhere else with this, I'd now regale you with research on the phenomenon, I'd explore the community of people building mechanical keyboards and those who restore equipment to their former glory, instead I'm encouraging you to dig whilst I talk about the second and third harmonics. This is about amateur radio after all.

Over the years there has been a steady stream of commentary around the quality of handheld radios. Some suggest that the cheaper the radio, the worse it is. Given that these kinds of radios are often the very first purchase for an aspiring amateur it would be useful to have a go at exploring this.

When a radio is designed the aim is for it to transmit exactly where it's intended to and only there. Any transmission that's not where you plan is considered a spurious emission. By carefully designing a circuit, by adding shielding, by filtering and other techniques these spurious emissions can be reduced or eliminated, but this costs money, either in the design stage, or in the cost of materials and manufacturing. It's logical to think that the cheaper the radio, the worse it is, but is it really true that a cheap radio has more spurious emissions than an expensive one?

To give you an example of a spurious emission, consider an FM transmitter tuned to the 2m amateur band, let's say 146.5 MHz.

If you key the radio and all is well, the radio will only transmit at that frequency, but that's not always the case. It turns out that if you were to listen on 293 MHz, you might discover that your radio is also transmitting there. If you're familiar with the amateur radio band plan, you'll know that 293 MHz is not allocated as an amateur frequency, so we're not allowed to transmit there, in fact, in Australia that frequency is reserved for the Australian Department of Defence, and there's an additional exclusion for the Murchison Radio-astronomy Observatory.

293 MHz isn't a random frequency. It's twice 146.5 MHz and it's called the second harmonic.

There's more. If you multiply the base frequency by three, you end up at 439.5 MHz, the third harmonic. In Australia, that frequency falls into the amateur allocation as a second use, its primary use is again the Department of Defence.

These two transmissions are examples of spurious emissions. To be clear, the transmitter is tuned to 146.5 MHz and these unintended extra signals come out of the radio at the same time.

This is bad for several reasons, legal and otherwise. The first, obvious one, is that you're transmitting out of band, which as an amateur you already have no excuse for, since getting your license requires you to understand that this is strictly not allowed.

The International Telecommunications Union, or ITU, has specific requirements for what's permitted in the way of spurious emissions from an amateur station.

Spurious emissions also mean that there is energy being wasted. Instead of the signal only coming out at the intended frequency, some of it is appearing elsewhere, making the 5 Watts you paid for less effective than you hoped for.

So, what's this got to do with the click I started with?

Well, thanks to Randall, VK6WR, I have on loan a heavy box with a Cathode Ray Tube or Green CRT screen, lots of buttons and knobs and the ability to measure such spurious emissions. It's marked "HP 8920A RF Communications Test Set". Using this equipment is very satisfying. You switch it on and a fan starts whirring. After a moment you hear a beep, then the screen announces itself, almost as-if there's a PC in there somewhere - turns out that there is and the beep is the Power On Self Test, or POST beep. Originally released in 1992, this magic box can replace 22 instruments for transceiver testing. I started downloading user manuals, oh boy, there's lots to learn. Bringing back lots of memories, it even has a programming language, Instrument BASIC, to control it. Where have you been all my life? Turns out that in 1992 this piece of kit cost as much as my car. Anything for the hobby right?

At the next HAMfest I'll be using it to measure as many handhelds as I can get my hands on and taking notes. I have no idea how many I'll be able to test, but I'm looking forward to putting some numbers against the repeated claims of quality and price. I can tell you that a couple of weeks ago I got together with Randall and Glynn VK6PAW and spent an enjoyable afternoon testing several radios and there are some surprising results already.

Perhaps this is something you might attempt at your next community event, gather data, rather than opinions...

~ I'm Onno VK6FLAB

The International Telecommunications Union, or ITU, has specific requirements for what's permitted...

Starting to measure spurious emissions…

by ONNO BENSCHOP VK6FLAB

At a recent local HAMfest we set-up a table to measure second and third harmonic emissions from any handheld radio that came our way. The process was fun and we learnt lots and in due course we plan to publish a report on our findings.

When we received a handheld, we would disconnect the antenna, and replace it with a short length of coax and connect it to a spectrum analyser. We would then trigger the Push To Talk, or PTT button and measure several things. We'd record the actual frequency and how many Watts that the transmitter was producing and then record the power level in dBm for the base frequency, double that frequency and triple that frequency. In other words, we'd record the base, second and third harmonics.

This resulted in a list of numbers. Frequency and power in Watts are obvious, but the three dBm numbers caused confusion for many visitors. The most perplexing appeared to be that we were producing negative dBm numbers, and truth be told, some positive ones as well, we'll get to those in our report.

How can you have negative power you ask?

As I've discussed before. A negative dBm number isn't a negative value of power, it's a fraction, so, -30 dBm represents 0.000001 Watts and you'd have to admit that -30 dBm rolls off the tongue just a little easier.

What we measured and logged was the overall transmitter output and at specific frequencies. As I've discussed previously, if you transmit using any transceiver, you'll produce power at the intended frequency, but there will also be unintended or unwanted transmissions, known as spurious emissions.

The International Telecommunications Union, or ITU, has standards for such emissions. In Australia the regulator, the ACMA, uses the ITU standard for radio amateurs, but I should point out that this might not be the case where you are. It's entirely possible, and given human diversity, probable even, that there are places where there are more stringent requirements, so bear that in mind.

I'll state the standard and then explain.

For frequencies greater than 30 MHz, the spurious emission must not exceed the lesser of 43 + 10 * log (power) or 70 dB.

That might sound like gobbledegook, so let's explore.

First thing to notice is that this is for transmissions where the transmitter is tuned to a frequency greater than 30 MHz, there's a separate rule for frequencies less than 30 MHz and the ITU also specifies a range of different limits for special purpose transmitters like broadcast radio and television, space services, and others.

Second thing is that the spurious emissions are calculated based on total mean output power. This means that your spurious emissions are considered in relation to how much power you're using to transmit and it implies that for some transmitters you can be in compliance at one power level, but not at another, so keep that in mind.

The phrase "the lesser of", means that from a compliance perspective, there's a point at which power levels no longer determine how much attenuation of spurious emissions is required. You can calculate that point. It's where our formula hits 70 dB, and that is at 500 Watts. In other words, to meet the ITU standard, if you're transmitting with less than 500 Watts, you're subject to the formula and if you're transmitting with more than 500 Watts, you're required to meet the 70 dB standard.

It means that, at least in Australia, spurious emissions for amateurs are dependent on transmitter power because the maximum permitted power is currently 400 Watts for an amateur holding a so-called Advanced License.

Now I'll also point out explicitly that the emission standards that the ITU specifies are for generic "radio equipment", which includes amateur radio, but also includes anything else with a transmitter.

One thing to mention is that spurious emissions aren't limited to the second and third harmonics that we measured, in fact they're not even limited to harmonics. If you're using a particular mode then anything that's transmitted outside the bandwidth of that mode is considered a spurious emission and there are standards for that as well.

As an aside, it was interesting to me that in many cases amateur radio is treated separately from other radio services, but the ITU considers our community just one of several spectrum users and it's good to remember that the entire universe is playing in the same sandbox, even if only some of it is regulated by the ITU and your local regulator.

So, let's imagine that you have a handheld radio that has a total mean power output of 5 Watts. When you calculate using the formula, you end up at 50 dB attenuation. In other words, the spurious emissions may not exceed -13 dBm. So, if your radio measures -20 dBm on the second harmonic, it's compliant for that harmonic, but if it measures -10 dBm, it's not. I should also point out that this is for each spurious emission. About half the radios we tested had a second harmonic that was worse than the third harmonic.

So, what does this mean for your radio? I'd recommend that you start reading and measuring. You'll need to measure the total mean power, and the signal strength at the base frequency and the second and third harmonic. I will mention that surprises might happen. For example, the Yaesu FT-857d radio I use every week to host a net appears to be transmitting with a power level that doesn't match its setting. At 5 Watts, it's only transmitting just over 2 Watts into the antenna, but at the 10 Watt setting, it's pretty much 10 Watts.

You also don't need a fancy tool like we were using. All these measurements are relative to each other and you could even use a $20 RTL-SDR USB dongle, but before you start transmitting into its antenna port, make sure you have enough attenuation connected between the transmitter and your dongle, otherwise you'll quickly discover the escape velocity of the magic smoke inside.

~ I'm Onno VK6FLAB

All podcast transcripts are collated and edited in an annual volume which you can find by searching for my callsign on your local Amazon store, or visit my author page: http://amazon.com/author/owh. Volume 7 is out now.

Feel free to get in touch directly via email: cq@vk6flab.com, follow on twitter: @vk6flab or check the website for more: http://vk6flab.com/

If you'd like to join a weekly net for new and returning amateurs, check out the details at http://ftroop.vk6flab.com/, the net runs every week on Saturday, from 00:00 to 01:00 UTC on Echolink, IRLP, AllStar Link, IRN and 2m/70cm FM via various repeaters.

If you'd like to participate in discussion about the podcast or about amateur radio, you can visit the Facebook group: https://www.facebook.com/groups/foundations.itmaze

This podcast episode was produced by Onno (VK6FLAB). You can find more at http://vk6flab.com/

KB6NU'S HAM RADIO

Having fun with POTA

I can fit my entire POTA station into a small toolbox

by DAN ROMANCHIK KB6NU

Dan Romanchik KB6NU blogs about amateur radio at KB6NU.com when he's not trying to figure out which way current flows. Dan teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com

I've been doing more Parks on the Air (POTA) operation this summer now that I'm "retired." It's been a lot of fun. Not only that, I've learned some stuff.

Here's how my activations usually go. Two or three of us—my partners in crime have included Rick K8BMA, Paul KW1L, and my wife, Silvia—leave my house about 8:30 am and head up to K-3315, the Island Lake Recreation Area. The park is less than a half hour from my house.

After we get there, we set up, play around with the radios for an hour or so, eat lunch, and then go home. We don't make as many contacts as some POTA activators, but we enjoy the outdoors and have fun shooting the breeze with one another.

Setup is pretty quick. I can fit my entire station, including my KX-3, BioEnno 9 Ah battery, Kent paddle, antenna, assorted cables, and even the KX-3 microphone(!) in a small toolbox. I pull everything out of the toolbox, plug it all together, and then put up the antenna.

My doublet antenna

The antenna that I've been using is a 66-ft. doublet made with some wire-wrap wire that I salvaged from a company dumpster many years ago. The feedline that I'm using is some twisted pair that I just happened to have laying around. The antenna coils up nicely and fits into a corner of the bottom of the toolbox.

One thing that I like about this antenna is that because it's a full half-wave on 40 meters, it's more efficient than a Buddipole or other similarly short antennas. I connect

the feedline directly to the KX-3 with a BNC-binding post adapter, and the KX-3 tuner cranks out a match on all bands above 7 MHz.

To hang the antenna, I had been using a tennis ball to toss a couple of lines up into trees to support the two ends of the antenna. This winter, though, I purchased a Spiderbeam 10-meter, telescoping, fiberglass mini pole from Vibroplex, and I've started using this pole to support the center of the antenna operate the doublet in an inverted-V configuraton. This works very nicely, and because I'm getting the center of the antenna up more than 25 feet, it seems to work better than when the ends were up 20 feet or less.

My first attempt at using this pole was kind of kludgey. We moved a picnic table, and tried lashing it to the table. That single point of support didn't work out so well, so we also tie-wrapped it to a nail sticking out of the eaves of the picnic shelter. That kept the pole vertical, but it certainly wasn't a optimum solution.

After that activation, I search for better ways to set up that pole and came across a couple of YouTube videos. I had meant to go buy the piece of PVC pipe and straps recommended in the videos, but as usual, I didn't get around to it. So, before the next activation, I searched my basement and garage for something that I could use.

What I came up with you can see in the photo at right. I had the stakes that you see in the photo from a gardening project. I reckoned that if I could pound them into the ground in a triangular pattern around the pole, then strap it all together, it would be sturdy enough for a three- or four-hour POTA activation. And, indeed it was.

One of the reasons that it worked is that the Spiderbeam pole comes in a tube that seems almost designed exactly for this kind of setup . The bottom has a rubber "foot" that provides a secure interface with the ground, and the other end of the pole had a ring that you can snug everything up to. I'm' not sure that I'd try this on a DXpedition to Bouvey Island, but for a casual outing to the Island Lake Recreation Area, it works just fine. And, I didn't have to buy a single thing!

My last activation

Yesterday, the team included my wife, Silvia, and me. We left the house just a little after 9:00 am, and by 10:00 am, I was on the air. I decided to get on 20 meters first, but after three contacts with stations in Florida, I QSYed to 40 meters.

On 40, the contacts came fast and furious. By 11:20 am, I'd made 29 contacts, filling up two pages in my mobile log book. That was enough for me. I turned off the rig, took a little hike to the platform overlooking the lake to enjoy the view, and then had lunch with my wife. After lunch, we packed up and got home about 1:00 pm.

One of the things that I want to do before my next activation is print out a WTH card for POTA activations. I have one for lighthouse activations, but one describing POTA would be cool.

I also want to experiment with antenna placement. It may be just coincidence that I worked Florida stations on 20 meters as my first three contacts, but the antenna ran east to west, meaning that north and south

I can fit my entire POTA station into a small toolbox, including the KX-3, battery, antenna, accessories, and dual -lever paddle. And, I can even carry some tools along as well!

was broadside to the antenna. Perhaps, if I'd set it up differently, I'd have worked stations to the east and west as well.

Whatever happens, it's all fun, and that's the point of ham radio after all, isn't it?

~ *Dan KB6NU*

DIY USB-to-CIV cable

I'm a big fan of building things like this yourself. Not only do you spend less money, you learn something in the process.

DIY ICOM Rig control cable CI V: Reliable and very ...
Share
You can add this to the list of home made Icom CI-V cables .
I just made this one and it worked. I used a different kind of $2 usb to ttl board because I had one (silicon labs CP210x is what it says)
Here is schematic - only need a resistor and diode.
Larry WT9M
More videos
IN 3 HOURS
ESP32
BOARD DESIGN
DIY
FLASH NAS
3:35 / 7:55
YouTube

No-Ham Recipes

by GLENNA BARRON VE7DSC

Cuban Goulash

Grace told us, "l first served this over egg noodles, but served over rice is also good. This recipe was given to me by a Cuban friend when I was seven years old. To this day, (twenty years later), it remains one of my favourites. Don't be frightened by the seemingly strange combination of ingredients; this is brilliant! You can double triple or increase the recipe further to feed large gatherings." Makes 6 servings.

- 1 pound (454 g) boneless pork roast, cubed
- 1 pound (454 g) onions, diced
- 1 pound (454 g) bananas, peeled and diced
- 1 tablespoon (15 ml) vegetable oil
- 1 - 16-ounce (500 ml) can diced tomatoes with juice
- Cayenne pepper to taste
- Salt and ground black pepper to taste

Over medium heat, in a large skillet, heat the oil and brown the pork cubes on all sides. Add the onions, cooking and stirring until they are tender, then add the bananas and tomatoes (with juice). Mix well. Bring to a boil, reduce heat to medium-low, and then simmer 30 minutes, stirring occasionally, until pork is very tender. Season with cayenne pepper, salt, and pepper. Serve over rice or cooked egg noodles.

Back to Basics

From The Canadian Basic Question Bank

Reciprocal Operating Agreements and Arrangements

John Schouten VE7TI has been teaching amateur radio courses for over 20 years, and is the Course Coordinator for Surrey Amateur Radio Communications

Facilitating Amateur Radio Communications Across Borders

B-1-14-10 Which of the following is not correct? While operating in Canada a radio amateur licensed by the Government of the United States must:

A. obtain a Canadian amateur certificate before operating in Canada

B. add to his call sign the Canadian call sign prefix for the geographic location of the station

C. qualify his identification when operating phone by adding to the call sign the word "mobile" or "portable" or when operating Morse code by adding a slash "/"

D. identify with the call sign assigned by the FCC

B-1-21-2 A Canadian radio amateur, operating his station in the state of Florida, is subject to which frequency band limits?

A. ITU Region 1

B. Those applicable to US radio amateurs

C. ITU Region 2

D. ITU Region 3

B-1-21-3 A Canadian radio amateur, operating his station 7 kilometres (4 miles) offshore from the coast of Florida, is subject to which frequency band limits?

A. Those applicable to Canadian radio amateurs

B. ITU Region 1

C. ITU Region 2

D. Those applicable to US radio amateurs

Amateur radio enthusiasts thrive on the ability to communicate with fellow enthusiasts around the world, transcending geographic boundaries and cultural differences. To enable this global exchange of ideas and experiences, reciprocal operating agreements and arrangements have been established between Canada and other countries or administrations. These agreements outline the rules and privileges that govern the operation of amateur radio equipment and stations for visiting amateurs. Additionally, this section sheds light on communications on behalf of third parties in the context of international amateur radio operations.

One notable agreement is the Convention between Canada and the United States of America. This treaty, documented in Treaty Series 1952 No. 7, establishes the guidelines for operating amateur radio service equipment and stations in each other's territories. Visiting amateurs from Canada or the United States are not required to register or obtain permits prior to operating amateur radio stations. However, it is essential for each station to indicate its geographical location, such as the city and state or city and province, at least once during each contact with another station. Furthermore, the amateur station must adhere to the laws and regulations of the country where it is temporarily located. An example would be a US licensed Amateur operating in BC. The station identification would be their call (KN7Q) the word “stroke”, “slash”, or “/” followed by the prefix of the visited Province (VE7). So, in our example, that station would identify as *“KN7Q stroke Victor Echo 7, mobile, Vancouver, British Columbia”* at the start and end of their contact. It is written in a log as KN7Q/VE7. American resident amateurs visiting Canada must be **U.S. citizens** and comply with the Radio-communication Regulations and RBR-4 when operating here.

Under this convention, Canadian amateurs operating in the United States enjoy the same privileges they have in Canada. However, they are subject to U.S. band edges and mode restrictions as outlined in the FCC Regulations. As an example of a Canadian station operating in the United States, they would identify as *“VE7TI stroke Kilo 7, mobile, Seattle, Washington”* at the start and end of their contact.

Apart from the agreement with the United States, Canada has also entered into multilateral operating agreements that facilitate temporary operations by Canadian amateur stations in other countries. One such agreement is CEPT Recommendation T/R 61-01, which stands for Conférence européenne des administrations des postes et des télécommunications. CEPT's Recommendation T/R 61-01 is a licensing system that permits licensed amateurs from member and recognized non-member countries to operate in other participating countries. A list of these countries can be found online, providing Canadians with the opportunity to operate their amateur radio stations while visiting those nations.

It is important to note that a Canadian-issued CEPT permit does not hold any legal status within Canada. To qualify for a CEPT license under T/R 61-01, Canadian amateurs need to possess an Amateur Radio Operator Certificate with both Basic Qualification and Advanced Qualification, with their call sign mentioned on the certificate. Once qualified, they must abide by the provisions set by the administration of the country in which they intend to operate their station.

Similarly, a foreign amateur with a CEPT T/R 61-01 license visiting Canada is granted operating privileges equivalent to a Canadian amateur holding an Amateur Radio Operator Certificate with both Basic and Advanced Qualifications.

The responsibility of issuing CEPT permits in Canada has been delegated to the Radio Amateurs of Canada (RAC). Applicants are required to provide their name, address, call sign, class of certificate, and photocopies of the station license and operator certificate. RAC charges a fee for processing and administration, and detailed instructions for applying for a CEPT permit can be found on their website.

Another international agreement relevant to Canadian amateur operators is the International Amateur Radio Permit (IARP) issued under the Inter-American Convention. Canada is a signatory to this convention, which enables participating countries to issue IARPs. The permit is divided into two classes: Class 1 and Class 2. Class 1 permits are granted to individuals holding an Amateur Radio Operator Certificate with Basic Qualification and Morse Code (12 w.p.m.), while Class 2 permits are issued to those with only the Basic Qualification. The possession of an Advanced Qualification and Morse Code (5 w.p.m.) does not influence the classification of the IARP.

Holders of a Class 1 permit are authorized to utilize all frequencies and emissions allocated in the amateur radio service (in Canada the Basic with Honours certification), while Class 2 permit holders are limited to amateur allocations above 30 MHz (in Canada the Basic certification), subject to the provisions of the country being visited. Similar to the CEPT permit, a Canadian-issued IARP does not possess any legal status within Canada. Foreign amateurs licensed by administrations participating in the IARP programs must apply for the appropriate permit in accordance with their home administration's regulations.

The issuance of IARPs to Canadians is restricted to its citizens, and delegated to the Radio Amateurs of Canada (RAC). Applicants are required to provide their name, address, call sign, class of certificate, photocopies of the operator certificate, and a recent passport-sized photo. RAC charges a fee to cover administrative and handling costs, and detailed instructions on how to apply for an IARP can be found on their website.

It is important to acknowledge that every foreign administration has the authority to determine whether a Canadian amateur is permitted to operate an amateur station while temporarily within its territory. These administrations can impose conditions or restrictions as they see fit. To ensure a smooth and lawful operation, Canadians are strongly advised to contact the responsible administrations well in advance of their visits to obtain the necessary documentation and permission, if required. The Radio Amateurs of Canada (RAC) website is a valuable resource for accessing information on operating in other countries.

Additionally, the section on reciprocal operating agreements and arrangements emphasizes that Canada does not prohibit international communications on behalf of third parties. While any foreign administration may permit its amateur stations to communicate on behalf of third parties without the need for special arrangements with Canada, it is essential to follow the guidelines established by the visited country. However, during emergencies or disaster relief operations, international third-party communications are expressly permitted unless explicitly prohibited by the foreign administration.

There is also a question that deals with watercraft and international waters. A Canadian radio amateur operating their station seven kilometers offshore along the coast of Florida is subject to frequency band limits applicable to US radio amateurs. International waters extend beyond eleven miles (17.7 Km) offshore and if you are within 11 miles offshore, and in this case its the United States, you must hold yourself to the regulations in place for US radio amateurs. So, you're subject to the frequency band limits applicable to US radio amateurs and their requirement to identify every 20 minutes. If you are operating off the coast of Britain, for example, there may be an entirely different set of rules in place corresponding to UK amateurs.

If you plan to operate from a cruise ship, you must notify the captain and obtain the ship's permission. If you're fortunate you will get that permission and you may even receive a tour of their radio room, as I have in the past.

The reciprocal operating agreements and arrangements discussed in this section serve to foster international cooperation and enable amateur radio enthusiasts to enjoy their hobby while visiting foreign countries. These agreements facilitate seamless communication across borders, allowing for the exchange of knowledge, experiences, and cultural understanding. As technology continues to advance, it is vital to maintain and adapt these agreements to promote global amateur radio activities while respecting the regulations and laws of the respective countries involved.

To get back to the questions:

B-1-14-10 Which of the following is not correct? While operating in Canada a radio amateur licensed by the Government of the United States must:

A. obtain a Canadian amateur certificate before operating in Canada

Canada and the US have a reciprocal agreement which permits amateurs from one country to operate in the other country. While in Canada, the US amateur identifies with his call sign, the qualifier "mobile" or "portable" and the prefix of the Canadian province/territory.

B-1-21-2 A Canadian radio amateur, operating his station in the state of Florida, is subject to which frequency band limits?

B. Those applicable to US radio amateurs

When operating within a country or within territorial waters (generally, 12 nautical miles or 22 kilometres from the shore), the regulations of the specific country apply.

B-1-21-3 (D) A Canadian radio amateur, operating his station 7 kilometres (4 miles) offshore from the coast of Florida, is subject to which frequency band limits?

D. Those applicable to US radio amateurs

This close to the shore is not yet considered "international waters". When operating within a country or within territorial waters (generally, 12 nautical miles or 22 kilometres from the shore), the regulations of the specific country apply.

~ John VE7TI

How to Apply for an IARP (Canadian citizens only)

The Minister of Industry has delegated Radio Amateurs of Canada to issue these permits. To apply for an IARP permit, please complete the form below:

Instructions:

To apply for an IARP permit, fill out the information on the RAC website, and submit along with a photocopy, electronic picture or pdf screen shot of your radio licence certificate, (Basic or Advanced, and Morse code qualifications if applicable). You will be required to attach a passport-size photo to your permit once it is in your possession.

RAC members will receive a $10.00 discount for a total cost of $25.00.

Once the form has been submitted the content will automatically be sent to the RAC Office for processing. On completion of processing you will be emailed a scan of the document for confirmation and an invoice for processing fees will be sent to you. Once this invoice is paid the physical permit will be sent via standard mail. You have the option of mailing in your payment and documentation; please contact the RAC office for details.

- The International Amateur Radio Permit (IARP) requires your signature on the line directly beneath your photograph.
- Your valid Canadian Amateur Radio certificate must accompany the IARP at all times.
- Unless otherwise required by regulations of the country visited, station identification shall be (prefix of the visited country or region thereof) the word “stroke” or “/” followed by the your call sign.
- The IARP is valid for one year from the date of issue of the permit.
- A visited country may decline to honour, suspend or cancel the operation of an IARP.
- Some countries may require you to notify in advance the date, place and duration of your stay.
- It is understood that this permit shall in no way affect the obligation of the holder to conform strictly to the laws and regulations relating to the operation of an Amateur station and Amateur-satellite station in the country in which the station is operated.

It is suggested that Amateurs planning to use an IARP contact the national Amateur Radio society in the country to be visited to find out whether there are any additional restrictions or requirements that may apply.

~

Calling all New Amateurs: Get your Name in Lights!

Did you get your Amateur Radio certficate within the past year or two and want to introduce yourself through TCA to the Amateur Radio community? If so we would love to hear from you.

Drop a line to tcamag@yahoo.ca and tell us how you were introduced to the magic of Amateur Radio.

Do you credit any particular Amateur ("Elmer") with getting you started? Which aspect of the hobby do you enjoy so far?

Please be sure to include your name, call sign, date and level of certificate – and don't forget to include a photo or two. We hope to hear from you soon!

Our Radio Courses

Do you need more information about our courses?

https://bit.ly/RadioCourses

or scan the QR-code with your smart-device camera

Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:

1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank. http://tinyurl.com/CanadaBasicQB
2. Industry Canada (ISED) on-line practice page: https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form
3. The Amateur Radio Exam Generator is at: https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html
4. The ExHaminer Study software for Windows is at: https://wp.rac.ca/exhaminer-v2-5/

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.

SURREY AMATEUR RADIO

CWcourse

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7 WEEKS · TUESDAYS · 7-8:30 PM · $30

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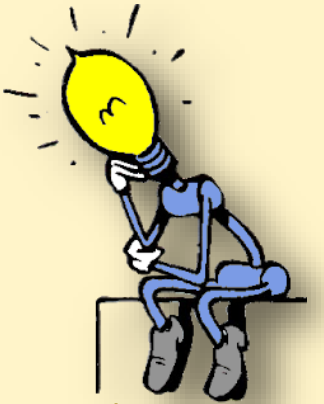
At our training facility · 5756 142 Street · Surrey

Those pesky block diagrams

More information needed? Click: https://bit.ly/SARCcourses

Our new students are often confused by the block diagrams for receivers and transmitters that are part of the Canadian Basic Amateur Radio Question Bank, and it is frequently mentioned in our course feedback as one of the more challenging lessons. As we have previously mentioned, there is a freeware program to practice assembling block diagrams called 'Ham Puzzle available as a free Windows download from Radio Amateurs of Canada at: https://www.rac.ca/wp-content/uploads/2014/04/HAMpuzzle/HAMpuzzle12.zip. It can also run under Wine on a Mac.

Even with Ham Puzzle our students continue to look for a better way to commit these block diagrams to memory. If you, or your club, are involved in instruction and you have a memory aid, we'd love to pass it on to our students.



~ John VE7TI
VE7TI@myrac.ca

SURREY AMATEUR RADIO

basiccourse

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7-WEEKS · ON-LINE · $80

Next course starts in September 2023—contact sarc@ve7sar.net

Includes classes, a comprehensive manual, videos and the exam fee

- Ideal for outdoors activities. Long range communications anywhere for free without commercial infrastructure
- Use satellite communication to speak around the world, perhaps even to an astronaut
- Participate in 'Radio Sports' like Contesting and Hidden Transmitter Hunts
- Enhance your personal and your community's preparedness in an emergency
- Use a radio, computer, smartphone or tablet for free worldwide voice and digital communications
- Practice an exciting hobby or start a career opportunity

City of Surrey
separ
Surrey Emergency Program Amateur Radio
https://separ.ca/

SARC
Surrey Amateur Radio Communications
http://ve7sar.net

SEPTEMBER 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	30	31 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	1	2 0730—Breakfast 0930-Noon—OTC Open
3	4 Labour Day 	5 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	6	7 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	8	9 Contest—CQ WAE DX SSB Langley Cruise-In 0730—Breakfast 0930-Noon—OTC Open
10 Contest—CQ WAE DX SSB Event: RunSurreyRun Holland Park 0800—Noon.	11 1900—On-line Basic course	12 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	13 1900 SARC General Meeting Surrey Fire Service Training Centre 14823 64 Avenue	14 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	15	16 Contest—CQ WA State Salmon Run (CW,SSB) 0730—Breakfast 0930-Noon—OTC Open 0930—POTA Workshop
17 Contest—CQ WA State Salmon Run (CW,SSB)	18 1900—On-line Basic course	19 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	20	21 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	22	23 Contest—CQ WW DX -RTTY 0730—Breakfast 0930-Noon—OTC Open
24 Contest—CQ WW DX -RTTY	25 1900—On-line Basic course	26 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	27 1900 SARC Director Mtg.	28 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	29	30 0730—Breakfast 0930-Noon—OTC Open

*Sunday, September 10: We still need operators to assist at the **RunSurreyRun** public event. Contact communicator@ve7sar.net to sign-up.*

Event details: SARC—SEPAR 'Live' calendar link

All contest information: WA7BNM Contest Calendar: Home

For details on all SARC events, go to ve7sar.net

October 2023

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 1900—On-line Basic course	3 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	4	5 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	6	7 07:30—Breakfast 0930-Noon—OTC Open 0930—Antenna Workshop
8	9 Thanksgiving Day (Canada) 	10 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	11 1900 SARC General Meeting Surrey Fire Service Training Centre 14823 64 Avenue	12 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	13	14 0730—Breakfast 0930-Noon—OTC Open 0930—Antenna Workshop
15 1000-1400—Delta ARS ComFest	16 1900—On-line Basic course	17 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	18	19 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	20	21 0730—Breakfast 0930-Noon—OTC Open
22	23 1900—On-line Basic course	24 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	25 1900 SARC Director Mtg.	26 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	27	28 Contest—CQ WW DX (SSB) 0730—Breakfast 0930-Noon—OTC Open
29 Contest—CQ WW DX (SSB)	30 1900—On-line Basic course	31 1930—SEPAR net 2000—SARC net Both VE7RSC 147.36 MHz (+) 110.9 tone	1	2 2000—GOTA Net New Hams: VE7RSC 147.36 MHz (+) 110.9 tone	3	4 0730—Breakfast 0930-Noon—OTC Open

Event details: SARC—SEPAR 'Live' calendar link

All contest information: WA7BNM Contest Calendar: Home

For details on all SARC events, go to ve7sar.net

Radio-Active

Profiles Of SARC Members

Meet Leandro Silva VE7LSI

coordinated by LARRY BLOOM VE7LXB

I was born in Brazil - Rio de Janeiro, to be more specific - where my parents and brother still live. Rio is a beautiful city with lots of gorgeous beaches and warm weather most of the year. It is also a very busy city. As a young boy I joined the scouts. Many of the adults involved with the scouts in Brazil are military people and many of them are also involved with ham radio. I was very young the first time I saw a radio and I instantly got interested, but I never really got into it as I was always "busy" with something else.

In time, I achieved a college degree in computer networks. I soon began my career working at an ISP in Brazil (Initially it was named Telemar, but then changed to "Oi") where I specialized in network infrastructure and routing. I worked there for about 8 years. After that I worked for a short time (about 1.5 years) for an investment bank called "BTG Pactual" and then moved to Cisco Systems where I supported large ISPs on the LATAM region.

I love Brazil, but I always had this thing for Canada which is difficult to put into words. I remember being 15 years old and telling my parents Canada is the place I would someday live. My mom says that even when I was a child, I always talked about Canada. I used to watch many documentaries about nature in general, so I am guessing that's where I learned about this beautiful country.

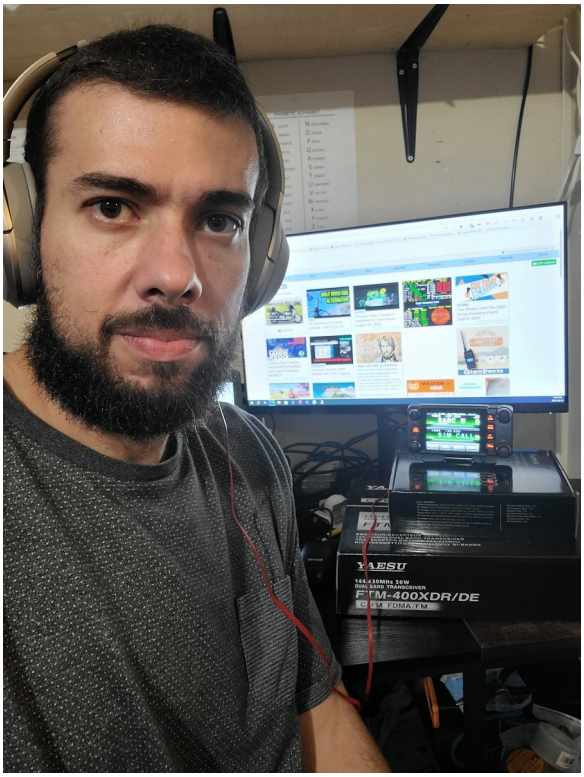
There were many factors that motivated me to move to Canada (always increasing crime rates in Rio, Politics, etc.), but I believe that I would have made the move anyway. Moving to Canada wasn't easy, but it was the right thing for me as I feel I am home here. My mother and father are moving to Canada soon, and my brother may follow shortly.

I moved here in July of 2015 and joined a company named Fortinet Technologies, a cybersecurity company. I still work there in the R&D department. Oh yes, my beautiful wife, Tatiana, and I have a 5-year-old daughter, Nina.

As for amateur radio, on many occasions, I would meet hams and get interested, but never really got serious about getting my license. Then one day, I decided to go for it. I looked for courses and found SARC. This worked out very well. Making the commitment to classes and getting to know other people with similar interests was beneficial. I am very happy with the hobby and with all the amazing people I am meeting.

I am at the stage in my ham radio journey where pretty much everything is interesting to me. For now, I am operating mostly on 2m, but HF has been my goal from the beginning. I believe in trying a little bit of everything, but what I think I may enjoy the most is POTA and SOTA.

For now, ham radio is my 3rd hobby. My first hobby is hiking. That's where I put most of my free time and effort. My 2nd hobby is photography. I am very lucky that all 3 hobbies work very nicely together.



Whenever I go on my hiking trips I always carry some camera gear. I am guessing I will also soon be carrying ham radio gear. I believe POTA and SOTA is something that I will enjoy doing a lot as I further explore ham radio. My biggest problem may be a heavy backpack. Lol.

That’s it for now. I look forward to meeting many of you on the air and hopefully some of you in person as well.

73

~ Leandro VE7LSI

The Contest Contender

The summer contest season

by JOHN BRODIE VA7XB

JOHN BRODIE VA7XB reporting on SARC's contesting efforts.

It's been a quiet summer for contesting, in keeping with other summer activities which rightfully take priority when the sun is shining.

Nevertheless, two of our seasoned contesters, Slawa VE7LWW and Sheldon VA7XH, elected to challenge contests on their own during this time, which we encourage.

The GOTA ("Get on the Air") newbies group under Larry VE7LXB's direction has also breathed new life into the contest group, as it has brought forth a few recruits (Larry VE7LXB, Doug VA7JDJ, Derek VE7VPG, Dmitry VA7DVO and Alex VA7PVC and others) who have enjoyed the experience and appear eager for more.

Other than the Canada Day Contest which was reported earlier, the only organized contest during the summer has been the Rookie Roundup RTTY contest in mid August – *see the separate report following.*

Contest preparations are good because they require that we ensure the equipment is fully operational. So it was in this case as erratic swr on our TH7 tri-band beam was observed and remedied just in time – see separate report in this Communicator.

Contests coming up this Fall include (September): the Worked All Europe Contest for SSB, the WA State Salmon Run (CW/phone) and the CQ WW DX Contest for RTTY, and; (October): the CQ WW DX Contest for SSB.

The complete list of available contests can be found at WA7BNM's Contest Calendar site: https://contestcalendar.com/index.html

Hope to see you there.

2023
CQ
2023
The Radio Amateur's Journal
Takes pleasure in awarding this Certificate of Merit to
VE7LWW
World Wide RTTY WPX Contest
#1 Canada (British Columbia)
Single Operator High Power All Bands
A Total score of 2,015,431 points was computed on the basis of the number of stations worked and call sign prefixes contacted. In witness of this achievement, we hereby affix our signatures on this day.
Ed Muns, W0YK
RTTY WPX Contest Director
Editor, CQ

Slawa VE7LWW and his CQ Worldwide RTTY contest certificate

The Rookie Roundup

With new interest In contesting stoked by Larry VE7LXB's GOTA success at Field Day, two members new to RTTY contesting challenged the ARRL Rookie Roundup for RTTY.

Doug VA7JDJ and Derek VE7VPG were coached by John VA7XB in the setup, operation and logging concepts. Larry VE7LXB had a last minute commitment and had to regretfully take a pass this time.

The contest was only 6 hours long from 11 am to 5 pm on Aug. 20th which meant higher bands only. In fact, the only RTTY activity was on 20m.

In accordance with the rules we only operated 100w. As anticipated, contest participation was fairly thin and allowed 14 contacts during the 3 active hours. This was perfectly acceptable for a first-time experience, as it provided ample opportunity between contacts to discuss strategy, logging techniques, radio operation and to resolve questions.

With this positive experience under their belts, the group resolved to make a serious attempt at the CQ WW DX contest for RTTY in late September when activity is expected to be hot and heavy. Doug, Derek and Larry are on board … who else wishes to take the plunge?

~ John VA7XB

2m QSO Party

11 Nov 2023

by HIROSHI TAKAHASHI VA7LET

How often has an operator said that they would like to participate in a QSO party, but cannot do HF at their QTH? Here is a way they can join us, on 2m! This year, we have added SSB as well as FM.

Nov 11st 2023, Saturday, from 10:00-14:30 PST, let's have a Party on 2m, FM or SSB. We can have a pause at 11:00 commemorate Remembrance Day. Use an FM simplex frequency between 146.415 and 147.570 MHz, or an SSB frequency between 144.200 and 144.275MHz.

Contest is open to all certified amateurs. Each QSO must have one station within Metro Vancouver, Vancouver and Gulf Islands, Southwest BC (Grids CN79, CN89 and CN99) or Northwest WA (only Grid Squares along the Canada-USA border: CN78, CN88, CN98) in order to be considered for points.

- Radios will be classified by power as QRP (10w or less), MED (11-49w), HIGH (50w or higher)
- Points will be given for the correct exchange of Callsign, Power class, Municipality.
- Stations may be MOBILE (calling from multiple Municipalities), or FIXED (one Municipality).

Each FM station worked is worth one point. Each SSB station worked is worth 2 points.

A Fixed station may be worked only once in each mode, while a Mobile station may be worked more than once if it has moved to a different Municipality. 10 bonus points for each municipality that you contact. 10 bonus points for each municipality you are transmitting from. (Shhhhh, your first contact could be worth 21 points (10+10+1 points)).

Valid FM operating frequencies include 146.415, 146.430, 146.445, 146.460, 146.475, 146.490, 146.505, 146.535, 146.550, 146.565, 146.580, 146.595, 147.420, 147.450, 147.480, 147.510, 147.540, 147.570 MHz. Valid SSB operating frequencies are between 144.200 and 144.275.

(ref: https://wp.rac.ca/144-mhz-2m-page/).

Electronic log files to be submitted in XLS or gsheet format to qsoparty@radioroom.ca by Nov 30, to be included in the scoring. No prizes will be awarded, but lots of admiration from your peers.

~ Hiroshi VA7LET

the OTC report

Recent improvements and repairs

We activate Saturday mornings 9:30am—noon

by JOHN BRODIE VA7XB

SEPAR and SARC share an Operations and Training Centre ("OTC") with South Fraser Search & Rescue.

Within that facility we have joint use of the classroom, kitchen, washrooms and social area, however, the radio room is strictly "our territory".

On the exterior, we have a 55 ft portable tower with a TH7 tri-band (10,15, 20m) beam and VHF/UHF beam on top. An off-centre fed dipole for 80 and 40m is supported by the trees.

The radio room hosts 3 stations comprised of an IC-7610 HF transceiver, a Flex 6600 HF transceiver, an IC-9700 VHF/UHF transceiver and a Kenwood TK-785 220 MHz transceiver.

In theory we can operate two HF radios on the same antenna at the same time, by deploying high power band pass filters and triplexer (for 10, 15, 20m) or diplexer (for 80, 40m).

We are continually exploring ways to improve the facilities so that they are immediately usable for an emergency or contest or for casual use to serve the needs of our members.

Recent improvements include:

- Replacement of the 12v lead-acid cells by two new Li-Fe-PO4 batteries and charger.

JOHN BRODIE VA7XB reporting on our SEPAR training and operations site.

- Installation of a custom module to remedy chronic instability in the IC-9700 transceiver.
- Installation of a remote antenna and ground connection in the classroom so that testing of other radios can take place. without disrupting the radio room operations.
- Replacement of coax from the VHF/UHF antenna on the tower to the radio room.
- Repair of the traps on the TH7 beam.

In addition, over recent months we have disposed of a large quantity of surplus and donated items and sorted the remainder, so that the storage container is now showing good order.

More work is yet to be done and that will continue through the fall and winter with the help of members.

Repairing the Traps on our Hygain TH7 Beam

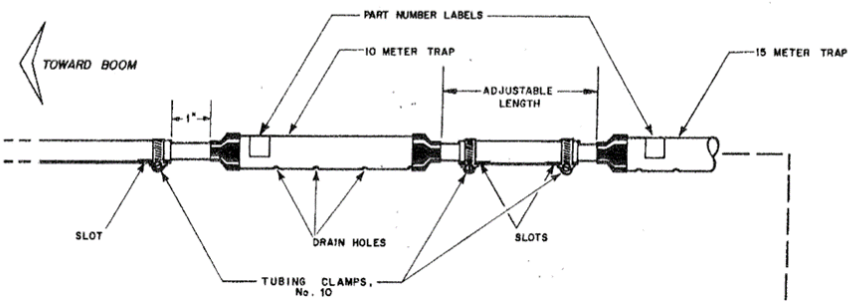
Our tri-band beam, the venerable Hygain TH7, has served us well over the years.

The TH7 relies on resonant traps to allow it to perform on 10, 15 and 20m. Traps are found on both driven and parasitic elements.

Occasionally, we have experienced erratic or higher-than-normal swr on one or more of the 3 bands, with the characteristic dip missing or shifted. This suggests a problem with the parasitic elements (i.e. directors and/or reflectors). Operation in this condition, although possible with a tuner, compromises forward gain and front-to-back ratio.

If the failure is in one of the two driven elements rather than the parasitic elements, it is usually obvious as the swr will be significantly higher than 3:1 across the band, to the extent that the impedance mismatch cannot be easily tuned out.

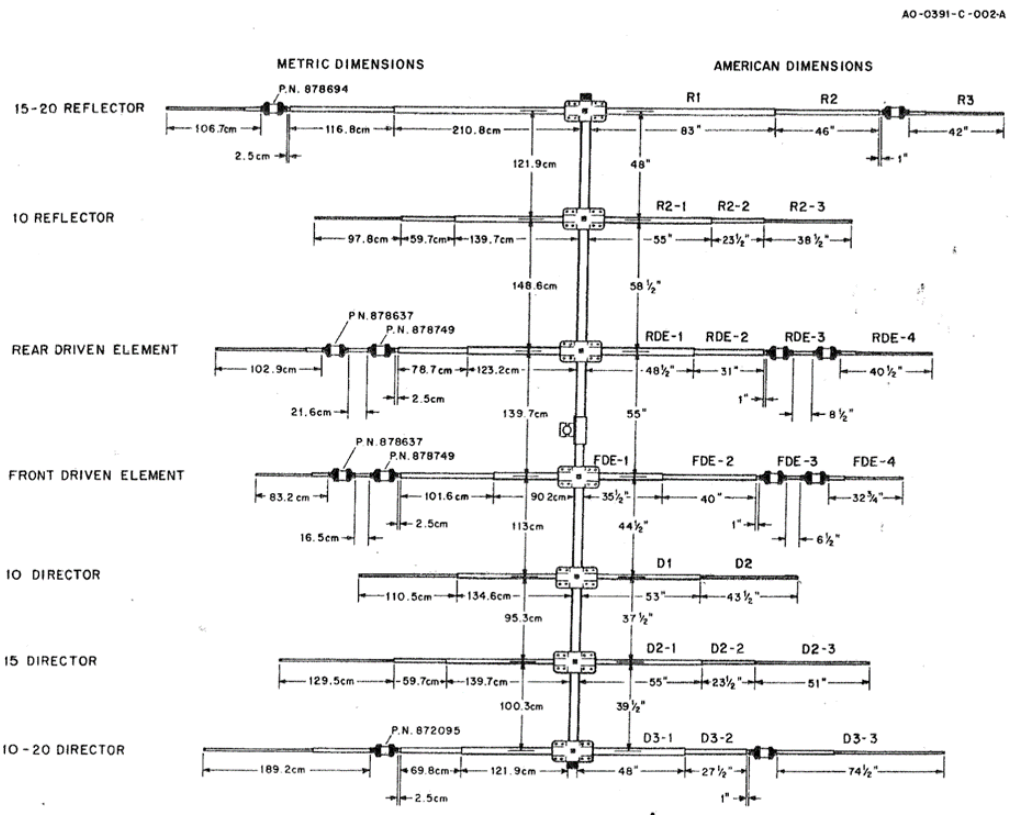
We recently experienced abnormal swr on all 3 bands, suggesting a trap failure in one

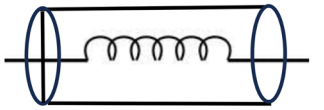


or more of the passive elements. It was not the first time.

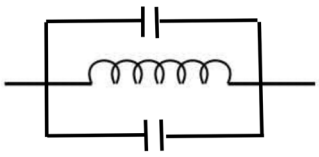
Traps are constructed as parallel L-C resonant circuits which electrically isolate portions of the element for their respective band. When 2 traps are used on one side of the element pair, the inner trap resonates at the middle of 10m band and the outer trap at 15m. The entire length of the element is used on 20m, as the traps are effectively a short circuit at frequencies other than their resonant frequency.

Physically the trap is comprised of a coil (L) connected at both ends to the element, and a metal shield (C) electrically connected at only one end to the element.



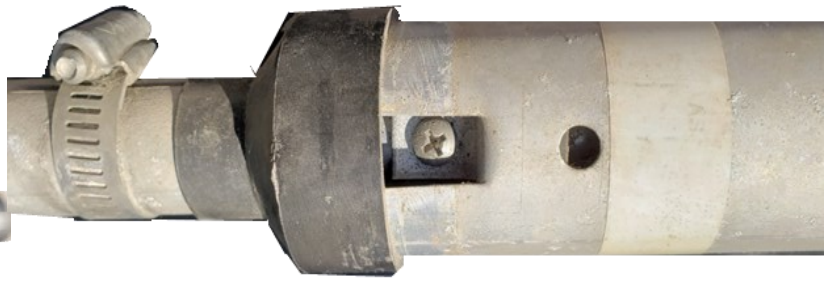


[3—right] Upper: Physical construction of trap. Lower: equivalent parallel L-C circuit



[4—Lower left] Outer end of trap shield (shown with protective boot slid away)

[5 –0 Lower right] Inner end of Trap shield connected by screw to element and coil (shown with boot slid away). Tighten or replace screw.



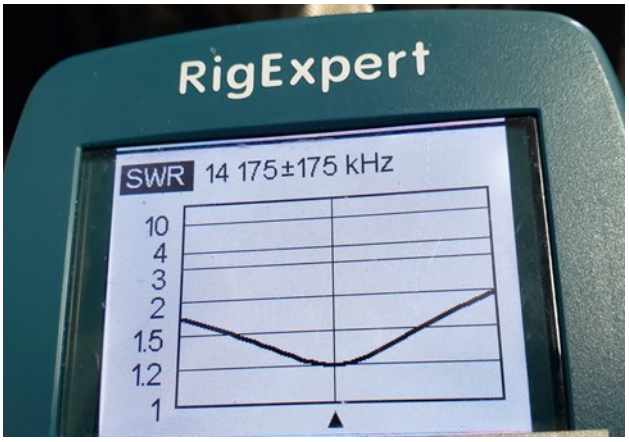
When working correctly, this configuration should provide a low resistance, as measured across opposite sides of the trap as well as between the trap casing and the element on both sides of the trap.

6 Measuring R across the trap - should be <1 ohm

7 Measuring R between trap shield and element – should be <1 ohm

Normally, R should be below 1 ohm in both instances. If R is above 1 ohm, removal of the plastic boot from the inner end of the trap and inspection of the connection is warranted. A loose or corroded sheet metal screw will likely be found at this point. Tightening the screw is one option, but the more permanent solution is to replace the existing ½" or 3/8" #8 screw with a larger #10 stainless screw of the same length.

After repairs were completed and the tower raised, the expected swr was achieved as shown in Figures 8 and 9.



8 SWR as it should be on 20m

9 SWR as it should be on 15m

This is a job ideally performed as preventive maintenance during good weather before problems are experienced. Or would you rather do it hours before the contest starts in February?

~ John VA7XB

My First POTA Activation Adventure

Boundary Bay Wildlife Management Area

by DMITRY S VA7DVO

Today marked a significant milestone in my amateur radio journey as I completed my first Parks on the Air (POTA) activation at the picturesque Boundary Bay Wildlife Management Area, designated as park VE-3245. Accompanied by my fellow enthusiast, Alex, we embarked on an exciting biking expedition to the park, our backpacks loaded with the essential equipment for a successful activation.

Our radio arsenal was led by the reliable Yaesu FT-891, a versatile and powerful transceiver that would be our communication lifeline throughout the day. To ensure optimal transmission and reception, we employed the JPC-12 Vertical telescopic antenna. Though slightly modified with improved counterpoises and an extended telescopic section, the antenna was carefully fine-tuned using the NanoVNA. This meticulous process enabled us to configure the antenna for 20 meters, with adaptability for 15, 17, 30, and 40 meters via a loading coil.

Remarkably, our antenna tuning prowess eliminated the need for an external tuner, as the antenna demonstrated remarkable resonance, achieving an SWR of 1.2 or better. Aiding our endeavors was the Digirig, an ingenious audio interface that seamlessly integrated with the FT-891. Its small stature belied its efficiency, providing the necessary audio connectivity for our digital operations.

In the realm of software, we turned to WSJT-X for FT8, a digital mode that would become our primary mode of communication. To simplify our logging processes and ensure seamless updates to ClubLog, we employed GridTracker—an

essential tool for automatic logging and various other conveniences. Our setup incorporated a robust power source, the Bioenno Power BLF-1215A battery, boasting 12V and 15Ah for extended operational periods.

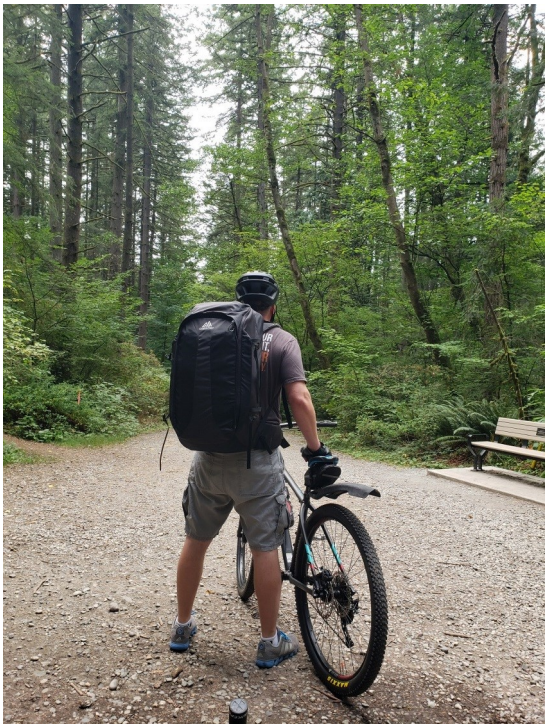
For efficient management and monitoring of our power supply, we devised a custom battery charge indicator box equipped with circuit breakers and a USB charger. This innovation exemplified our commitment to optimizing our setup for the most demanding conditions. While we anticipated requiring a DC-DC charger for the laptop, its battery surprised us with its endurance, negating the need for an additional power source.

As our activation unfolded, we embraced the magic of digital mode (FT8). The airwaves resonated with unceasing pileups, a testament to the prowess of our meticulously crafted setup. In contrast, voice operations (SSB) experienced intermittent success—initially yielding promising results but soon transitioning to silence. Yet, even amidst the challenges, a park-to-park connection with Illinois infused the experience with a sense of triumph.

Our power outputs varied for each mode, ranging from 40W for FT8 to 50W to 100W for SSB. While we acknowledged room for improvement in our SSB endeavors, the overall outcome resonated with success. A collection of captivating photographs encapsulated the day's achievements: from the laptop orchestrating WSJT-X to the strategically positioned radio and the indispensable battery splitter box. The omnipresent cell phone assumed the role of a Wi-Fi hotspot, facilitating real-time logging to ClubLog and rendering our accomplishments visible on my QRZ page.

The memory of our setup, poised against the backdrop of our antenna's reach, painted an image of dedication and achievement. The backpack that accompanied us was a testament to thorough preparation, ensuring no essential component was left behind. As I depart for a few weeks, I anticipate returning to the amateur radio club with renewed enthusiasm. My triumphant experience at Boundary Bay Wildlife Management Area shall undoubtedly inspire new endeavors, accompanied by the indomitable spirit of innovation that defines the amateur radio community.

~ Dmitry VA7DVO



Reprint Policies

These are policies for reprints from The Communicator, a bi-monthly journal about amateur radio and other topics published by Surrey Amateur Radio Communications (SARC).

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We welcome your comments and feedback

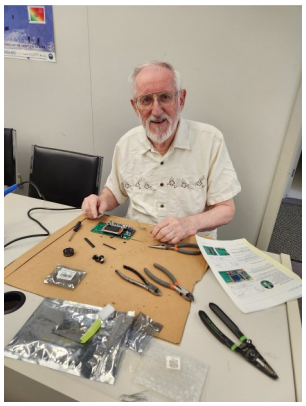
Please consider leaving a comment via email to communicator@ve7sar.net, or on our blog site https://ve7sar.blogspot.ca or, better yet, contact our authors directly, so they know someone is out there reading our publication.

Social Reminder

The Saturday weekly social gathering is once again 'on' at the Denny's Restaurant, 6850 King George Blvd., Surrey BC from 07:30—09:30. All are invited. Afterwards, we will host workshops and will be available to invigilate Amateur Radio exams at the OTC, 5756—142 Street, Surrey from 10-noon.

Bring your ham issues, our Elmers will try to help you sort them out.

SARC News…



***CW Tutor Workshops** left]*

All the tutors are now assembled and spoken for. SARC retained 3 for student CW course practice.

***GOTA Workshops** [below]*

To support our courses, Larry VE7LXB has organized 5 GOTA workshops to date with more on the horizon. Horace VA7XHB programs the transceivers with our local frequency plan.

Richmond Swap Meet

We got rid of quite a few items. Thanks to Dino and Horace for their assistance at the table, and to others for packing boxes in and out.

SEPAR

Family & neighbourhood communications

by GORD KIRK VA7GK

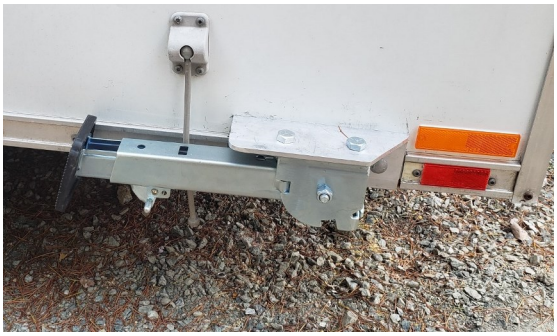
Since our last issue SEPAR has continued with our weekly nets and weekly Saturday drop ins at the Operations and Training Center (OTC). Prior to going to the OTC many attend the local Denny's for breakfast. Each week we see between 10-20 individuals often with some new first-time attendees as well. Along with SARC we have also had a couple of summertime social events to keep the friendships going strong. We have also seen several new "on the air" individuals move from the Get on the Air (GOTA) net to now start joining the regular nets. The GOTA net helps with practical issues including "mic fright" to have those recently licensed actually be comfortable with using their radios.

Work by a couple of our SEPAR members (John VA7XB and Steve VE7SXM) on the SEPAR trailer was also done. John completed the work of moving the inside lights and rewiring them, did some further work on the new outside front storage box as well as installed new rear stabilizer jacks. These help maintain the stability of the trailer when deployed and with the low ground clearance of the trailer took some work to get a workable solution.

Along with the installation of the storage box a couple of stabilizer arms were also installed to help with vibration on the Hi-Q screwdriver antenna also on the front.

Steve helped on the inside of the trailer with removal of an existing rack and remounting the radios on the front wall. He also rewired the radios

Gord Kirk VA7GK is a SARC Director and the SEPAR Coordinator



and created a new battery power solution inside. This now allows for the radios to be activated prior to generator or shore power being used. It is great to see the trailer refresh work being completed.

Work has also been ongoing by John VE7TI with the now second annual Run Surrey Run race being scheduled for September 10th. (We are looking for volunteers still to help with this event). John has been working with both the City and Race Organizers on the event plan to ensure that the communications component is well set up and full communications throughout the events course is available and covered by volunteer amateur radio operators. This is a great learning opportunity to work with the city and help those involved understand how communications may be run during an emergency instead of a fun event. More information about the event will come in a future issue.

This issue we want to continue with the personal communications plan theme. Last issue we explored your family communications PACE plan. This issue we want to start expanding to work with your neighbours.

Today as this is being written our Province (BC) is in the midst of the worst even recorded wildfire season. Hundreds of homes and commercial properties have been destroyed by fire and thousands have been forced to flee these terrible fires. More than 67,500 people are on evaluation alert with many fires being fought hard for multiple days and are still out of control. As these fires go through the power and communications infrastructure are also impacted. This can mean that even though your home is safe from the fire you can still be without power and communications. The ability to gather up-to-date and accurate information via the internet can be very difficult in these conditions.

In SEPAR we have been working on developing a plan to help non-amateurs communicate with each other within their immediate neighbourhood. In conjunction with the local Neighbourhood Emergency Preparedness Program, we have been working on a plan to use FRS/GMRS (non licensed) radios in the local area. Even though these radios are marketed on the package saying they will work up to 20-35 km the reality is these are good for approximately 1 km if you are outside. If you are talking from inside a building the range will be that much less. This range will allow neighbours to talk with each other.

If there is a single amateur in the community, that person can act a relay station to move the messages outside and back into the community. We have been working with the NEPP program and will provide a class on communications and offer licensing classes to help get someone in the neighbourhood licensed for amateur radio. This is an excellent strategy to use in your strata community/ townhouse group.

When explaining how the radios work, we advise users to pick a channel and not to use any privacy tones on the radios. These actually make the radio "deaf" to anyone without the correct tone and you may miss that someone is on the channel if these are in use. These low power radios will work well in a small area and if the next street over wants, they can select a different channel to make sure they don't interfere with one another. This can be repeated throughout the larger community, and you can basically hopscotch the FRS/GMRS channels through out the area (or city) reusing channels when they get too far away to cause interference with someone else using the same channel.

This idea is not new, and many communities have started some form of this in their area. In our region one of the best examples for this is the plan in use on Saltspring Island. They have the entire island mapped out with neighbourhood channels and can relay a message via each neighbourhood if needed. Now they also have several strong amateur radio operators in the community that can relay over much longer distances.

The draft plan in Surrey for FRS use does have some specific channels identified for other uses based on some of the best practices we have been able to identify in our research. Our sample plan also considers the radio channels 8-14 are low power and are good to use only within a neighbourhood. Channels 1-7 and 15-22 are high power and are best used to reach the entire neighbourhood or a surrounding area. Channel 1 is often taught to be used for distress calling and, in the US, the "Channel 3 Project" also recommends using channel 3 for calling others so we have designated this for general calling outside of the neighbourhood.

This means that we will recommend channels 2, 4-7 and 15-22 for various neighbourhoods as the dispatch channel and 8-14 within a neighbourhood to be used as needed.

Regardless of how you work the assignment of channels a plan on how to get information from within an area to the outside must be created. The plan is to select a primary high-power channel for your street and use it to help coordinate your plan.

Neighbourhood Dispatch Channel

To communicate with a) Block Captain or b) Team Leader or c) Incident Commander or d) local ham for external communication.

THIS IS THE INITIAL GO-TO AND MONITORING CHANNEL

Often it is your immediate neighbours that you are going to get help from in an emergency and working with them to find a way to communicate when regular communications fail should be part of you planning process. These local FRS channels can be used to check in with your neighbours and if you are the local amateur, you can put together a report on the condition of your community and any needs etc. that exist. You can use your amateur radio to get this information onto your local emergency responders or EOC to help in the local response to the ongoing emergency.

If you are interested in the SEPAR program and wish to become more involved, please let us know. Our website is www.separ.ca and there is a contact form to get in touch with us. We also have a blog with a dynamic news feed at https://ve7hme.blogspot.ca

Our weekly nets are every Tuesday night on the SARC repeater on 147.360 + T110.9 at 07:30 pm PST. All are welcome to check in.

~ *Gord VA7GK*
SEPAR Coordinator

separ
Surrey Emergency Program Amateur Radio

Regional Frequency Plan

Name	Frequency	Offset	CTCSS
VE7RSC (Primary Repeater)	147.360	+0.600	110.9
VE7RSC (Secondary Repeater)	443.775	+5.0	110.9
VE7RPT (Primary Regional Repeater)	146.940	-0.600	Optional 136.5 Rcve
Simplex 1	(VHF) 146.550		
Simplex 2	(VHF) 147.420		
Simplex 3	(UHF) 446.550		
Simplex 4	(UHF) 447.425		

Other frequencies in the Greater Vancouver area:

Primary:	Coquitlam/Abbotsford	146.430
Primary:	Inter-Municipal Group 3	146.445
Primary:	Vancouver; Mission; Sec. Coquitlam	146.460
Primary:	Kent-Mission; Sec. Richmond	146.475
Primary:	Inter-Municipal Group 2	146.490
Primary:	New West; Sec. Richmond	146.505
National	Calling / FM Simplex Group I	146.520
Primary:	North Shore; Port Coquitlam	146.535
Primary:	Bowen Island; Surrey	146.550
Intermunicipal Group 1 Coordination		146.565
Primary:	Lions Bay/Vancouver/Delta/Langley	146.580
Primary:	Port Moody; Sec: Burnaby	146.595
Secondary:	Vancouver/Surrey	147.420
Secondary:	Vancouver (UBC) / Maple Ridge	147.450
Primary:	White Rock/Chilliwack; Sec. No. Shore	147.480
Secondary:	Burnaby/Pitt Meadows	147.510
Primary:	Delta; Sec: Abbottsford	147.540
Primary:	Hope; Sec: Delta; ALSO EMBC	147.570

Ham Leftovers...

Our active sun and a once-in-century solar storm

The sun is getting more active than it has for a decade — and it could lead to power outages, grounded flights, and stunning auroras. See https://www.businessinsider.com/sun-more-active-solar-storms-auroras-poweroutages-grounded-flights-2023-2 and a once-in-century solar storm could fry power grids and knock out satellites. Here's why scientists worry it could happen soon. See https://www.businessinsider.com/rare-solar-storm-blast-power-grids-chancehigher-next-years-2023-8

Free radio handbook

Frank VE7KKV notes a Radio Handbook published by the BC Government. See https://www2.gov.bc.ca/gov/search?id=2E4C7D6BCAA4470AAAD2DCADF662E6A0&q=radio+handbook.

Hams

Want a better way to feed solder, but want to do it on the quick and cheap? Well, here is a solution for you in an old instructables post https://hackaday.com/2023/07/29/mechanical-pencil-solder-feeder-hack/

Update your Chinese handheld transceiver firmware

Here is a site that shows you how to modify, select additional features, and upload custom firmware to some Chinese handheld transceivers: https://hackaday.com/2023/08/13/update-your-chinese-radio-without-the-pain

A Letter to the Editor

A Letter to the Editor of the Kamloops This Week about Amateur Radio activity during emergencies. It's nothing new to us but a good message for the public. See https://www.kamloopsthisweek.com/opinion/letter-ham-it-up-during-emergencies- 7446755

We're QRT

Maintaining an Active Amateur Radio Club

Being a leader despite aging leadership

by JOHN SCHOUTEN VE7TI

John Schouten VE7TI is a Director with Surrey Amateur Radio Communications

Amateur radio service clubs play a vital role in fostering community, promoting technical expertise, and preserving the rich heritage of amateur radio communication. However, one challenge that many such clubs face is aging leadership within their ranks. Despite this obstacle, it is possible to maintain an active and vibrant amateur radio service club that remains a leader in the field. Lets explore strategies to ensure the longevity and success of SARC while addressing the issue of succession.

Encouraging Succession Planning

One of the most crucial steps in maintaining an active service club like ours is to encourage succession planning. Creating a culture within our club that values mentorship and the passing on of knowledge and experience to younger members. We must encourage senior members to identify potential leaders and actively involve them in club activities. By fostering a sense of responsibility and leadership in younger members, we ensure a smooth transition of power and prevent the leadership void that might result from inaction. Many clubs have periods of high activity followed by stretches of lifelessness. With luck a new leadership eventually restores vibrancy, but there is no guarantee that will occur. Likely we have all seen groups that were once prominent but that have now ebbed. In the case of Amateur Radio some once energetic groups are now reduced to occasional coffee klatches.

Embrace Technological Advancements

Amateur radio has evolved significantly over the years, embracing new technologies and modes of communication. To remain at the forefront of the field, a club must embrace these advancements. Encourage members to explore and

learn about new technologies, such as software-defined radios, digital modes, and internet-linked systems. Organize workshops, training sessions, and guest speakers to educate club members on emerging trends. By staying up to date with technological advancements, a club will attract new members, including younger enthusiasts. SARC is fortunate to be such an organization as evident by our highly successful course, workshop projects and our new ham 'Get on the Air' initiatives.

Foster an Inclusive Environment

To attract and retain younger members, it is essential to foster an inclusive environment within a club. Create opportunities for members of all ages and backgrounds to contribute and feel valued. Encourage open discussions, promote diversity, and embrace new ideas. By creating a welcoming atmosphere, you will not only attract younger members but also ensure that their voices are heard and their perspectives are considered.

Collaborate with Other Organizations

Collaboration with other organizations can breathe new life into your amateur radio club. Seek partnerships with local schools, colleges, and community groups interested in STEM education and technology. Organize joint projects, workshops, and events that promote amateur radio and engage young individuals. Collaborative efforts provide an opportunity to share knowledge, pool resources, and tap into fresh perspectives. These partnerships will also enable your club to establish connections with potential future leaders. SARC and our City of Surrey Emergency Program Amateur Radio (SEPAR) component has done this in the past with demonstrations about the science and technology behind communications at schools, community centres and the local public libraries.

Emphasize Community Outreach

Community outreach is a powerful tool for showcasing the importance and relevance of amateur radio. Engage in activities that demonstrate the value of amateur radio service to the community, such as participating in emergency communication drills, providing communications support for local events such as our local annual RunSurreyRun! event, or offering educational programs to schools and community groups. By actively engaging with the community, a club will gain recognition and attract individuals who may not have considered amateur radio as a hobby but also encourage them to explore the multitude of facets that this hobby provides.

While aging leadership may pose challenges to an amateur radio club, it should not deter you from maintaining an active and leading presence in the field. By implementing strategies such as encouraging succession planning, embracing technological advancements, fostering an inclusive environment, collaborating with other organizations, and emphasizing community outreach, a club can remain vibrant and attract new members despite the aging leadership. With dedication, adaptability, and a commitment to preserving the legacy of amateur radio, a club can continue to thrive and inspire generations to come.

We have managed it thus far.

~ John VE7TI

SARC SOCIETY DIRECTORS 2022-2023

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president at ve7sar.net

VICE PRESIDENT
John Brodie VA7XB
vicepresident at ve7sar.net

SECRETARY / WEBMASTER
Jeremy Morse VE7TMY
secretary at ve7sar.net

TREASURER
Scott Hawrelak VE7HA
treasurer at ve7sar.net

DIRECTORS

Gord Kirk VE7GK
(SEPAR Liaison)
SEPAR @ ve7sar.net

Larry Bloom VE7LXB
New Ham Coordinator
GOTA @ ve7sar.net

John Schouten VE7TI
(SARC Publications/Blog/Social Media & Courses)
communicator at ve7sar.net
course at ve7sar.net

Stan Williams VA7NF

SARC MEMBERSHIP & CONTEST MANAGER
John Brodie VA7XB
membership at ve7sar.net

SARC QSL MANAGER
(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER
Horace Bong VA7XHB
repeater at ve7sar.net

SARC NET MANAGER
Reg Natarajan VA7ZEB
net at ve7sar.net

A look back...

From The Communicator—August 2013

Past Communicators are available at:
https://ve7sar.blogspot.com/search/label/SARC%20Communicator
or search the complete Communicator contents & index at:
bit.ly/SARCindex

September and October

Here we go with another season of amateur radio activity! We had a great Field Day with copious GOTA contacts and two pleasant social events on our regular meeting nights.

Now its down to business!

Our September meeting has Les Tocko VA7OM presenting on Baluns. Les designed and built some of our OTC filtering and they perform great. Join us at the Fire Training Centre on September 13th at 7pm.

On October 11 we will have a presentation by Halden Field VE7UTS from the North Shore Amateur Radio Club. Halden's presentation will likely be on powering your equipment or on wire beam antennas.

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

*We have a '**Get On The Air**' net directed at new hams on Thursday evenings at 8pm, on our 2m repeaters: North: 147.360MHz+ Tone=110.9Hz and South: 147.360MHz+ Tone=103.5Hz. Our SARC Elmers will be on hand to answer your questions.*

	SARC Net 20:00 Hrs
1st Tuesday Standby	Gary VA7GPR Reg VA7ZEB
2nd Tuesday Standby	Andrew VA7LGN Sheldon VA7XNL
3rd Tuesday Standby	Vacant REG VA7ZEB
4th Tuesday Standby	Kapila VE7KGK John VA7XB
5th Tuesday Standby	Reg VA7ZEB John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	

Down The Log…

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the Surrey Fire Service Training Centre, 14923 - 64 Avenue, Surrey, BC. Here is a what3words link and map: https://what3words.com/markers.addiction.ozone

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Denny's Restaurant, 6850 King George Blvd., Surrey BC

Workshops

Saturday between 1000 and Noon at the OTC 5756 142 Street, Surrey

SEPAR Net

Tuesday at 1930 hrs local on 147.360 MHz (+) Tone=110.9

SARC Net

Tuesday at 2000 hrs local on 147.360 MHz (+) Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+ Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+ Tone=103.5Hz Fusion capable; No IRLP/EchoLink

1.2m: 223.960 Mhz -1.6 Tone=110.9Hz

70cm: 443.775MHz+ Tone= 110.9Hz
IRLP node 1737
WiRES-X Room ID 00047

We Have A SARC Patch!

These are suitable for sewing on a jacket, cap or your jammies, so you can proudly display your support for the club.

The price is $4 each or three for $10 and they can be picked up at a meeting or the weekly Koffee

Burnaby Radio Communications
Michael J. Wong VE7HMW
President/Owner
4257 Hastings Street
Burnaby, B.C.V5C 2J5
Phone 604-298-5444
Fax 604-298-5455
Commercial / Amateur Radio
Email: sales@burnabyradio.com
web: www.burnabyradio.com

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http://www.fleetwooddp.com/digital
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SARC Membership

Membership to Surrey Amateur Radio Communications is available at our web page at: https://ve7sar.net/join-donate/

Membership dues can now also be paid via eTransfer through payments@ve7sar.net or via PayPal.

These folks did a great job on the hydraulics for our antenna trailer.

18549-97 Ave., Surrey, BC, V4N 3N9 604-882-9787

http://www.htihydraulics.com/about-us.html

HYDRAULIC TECHNOLOGIES INC.